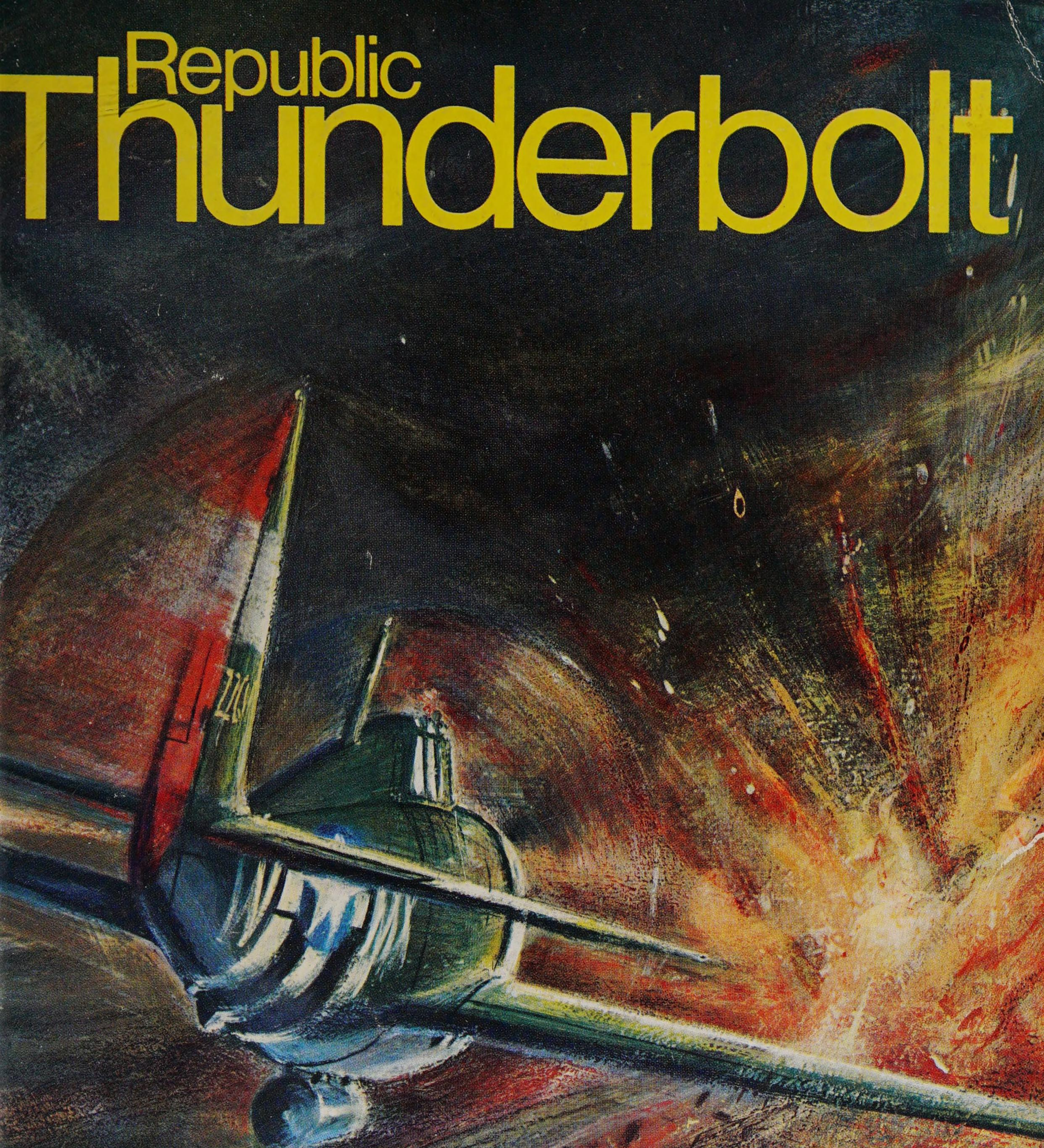
Republic Thunderbolt



REPUBLIC
THUNDERBOLT

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INTRODUCTION

The Republic P-47 Thunderbolt was a redoubtable fighter aircraft of the Second World War. Some of its contemporaries may have become more famous through the particular nature of their involvement in that conflict, but the Thunderbolt was as worthy as any. Few pilots detailed to fly the Thunderbolt in battle over a period of time failed to appreciate its dependability, durability, and devastating firepower; qualities which made it without par for ground-attack sorties. No other single-seat fighter of World War 2 afforded a pilot a better chance of survival. Although the largest and heaviest single piston-engined fighter ever flown in World War 2 combat, this did surprisingly little to detract from its value as an air fighting vehicle. In fact, the majority of the top American fighter aces engaged with the German Luftwaffe used the Thunderbolt. Understood and skilfully piloted, the Thunderbolt could be made to hold its own with the best of adversaries. Large in size, it was also built in larger quantities than any other United States fighter aircraft. The Republic Thunderbolt was, in some measure, a reflection of the character of the nation from whence it sprang; generous in proportions, with any shortcomings totally eclipsed by undeniable superlatives.

ROGER A. FREEMAN

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FROM RUSSIA WITH AMBITION

IN the Bolshevik revolution of 1917 may be found the root cause of many happenings that shaped the subsequent history of the twentieth century. An outcome of this violent time was that many Russians, neither safe nor welcome in their homeland, were obliged to seek a new life in other countries where more tolerant political regimes prevailed.

One such emigrant was Alexander P. Seversky—a native of Tiflis, Georgia—whose father had been the first private-owner pilot in Imperial Russia. In 1914 young Seversky learned to fly on a Farman biplane while training at the Russian Military School of Aeronautics. Commissioned as a Second Lieutenant in the Imperial Naval Air Service, he was posted to a seaplane bombing squadron in the Baltic Sea area. On his first night operation his aircraft was shot down and exploded when it crashed. Seversky escaped with his life but lost his right leg. After a period of convalescence, during which he helped supervise seaplane construction, he received special permission from the Tsar to return to combat flying. Promoted to Lieutenant Commander, Seversky first commanded a bombing squadron and then created a reputation as a successful fighter pilot, destroying 13 German aircraft in combat and being awarded many of Imperial Russia's highest decorations.

In September 1917, Seversky was sent to the United States of America, by way of France, as vice-chairman of a Naval Air Mission. Following the Revolution he decided to remain in the U.S.A. and worked for the Army Air Service as a consultant engineer, more specifically as a special assistant to Brigadier-General William 'Billy' Mitchell. In 1922, the U.S. Government purchased the rights of no fewer than 364 aeronautical patents Seversky had registered—including patents for a bombsight—and with the sum of $50,000 received he formed his first company, the Seversky Aero Corporation.

Alexander Kartveli was another Russian who had been sent to the West and did not return. Also born in Tiflis—birthplace of Joseph Stalin, too—Kartveli was a military cadet at St. Petersburg Academy when World War 1 broke out. As an artillery officer he was sent to the Turkish front and was later wounded in action.

By early 1918 Imperial Russia was in chaos and Georgia began setting-up its own administration. A few selected officers, Kartveli among them, were sent to Paris to study French military tactics. Soon all the Russias were engulfed by revolution and counter-revolution. Kartveli, like Seversky, was now without a country. Worse still, he was without funds and, extraordinarily—by aviation standards—he elected to become a circus trapeze artiste. Thus, and with extra money gained by teaching mathematics, he set about gaining the knowledge and experience to attain his ambition—degrees in aeronautical and electrical engineering. Then followed design and development periods with French companies including Avions Michel Wibault, Bleriot-Aeronautique, Avions Bernard Ferbois and the Societe de Telemecanique.

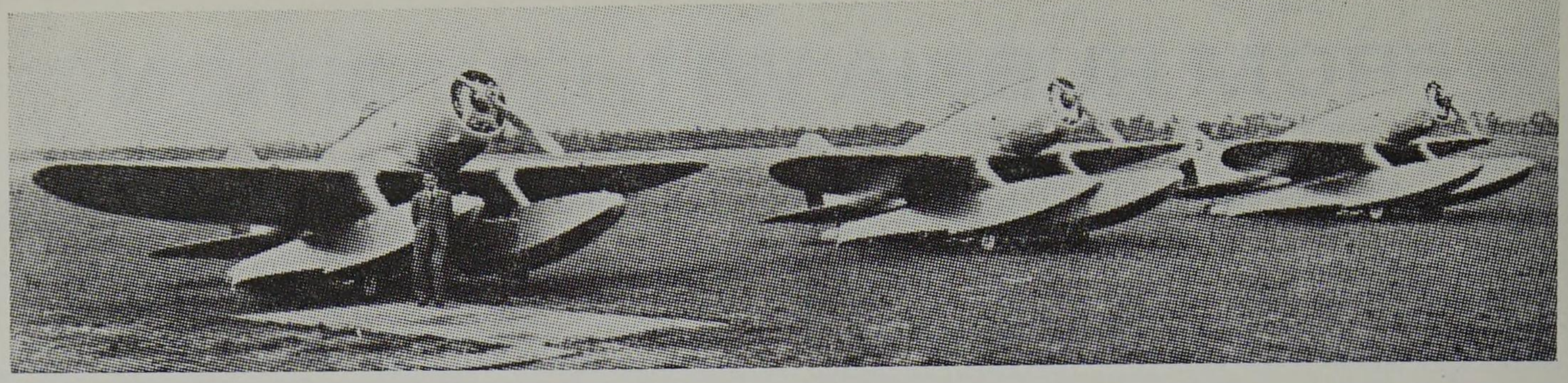
In 1927, engineer-designer Alexander Kartveli in Paris could have had little idea of the meeting he later organised with Charles A. Levine, President of the embryo Columbia Aircraft Corporation of New York. Levine, a dollar millionaire from scrap deals at the age of 30, was beaten by Lindbergh in his ambition to secure the Raymond Orteig prize of $25,000 for the first non-stop flight linking New York and Paris. But two weeks later, between June 4–6, and after some 43 hours of flying (as 'the first trans-atlantic aircraft passenger'), Levine landed about 100 miles south-west of Berlin. He and his pilot, Clarence D. Chamberlain—who flew Levine's Bellanca WB-2 monoplane 'Miss Columbia' (registered NX-237)—were given heroes' welcomes in Berlin and other European capitals before they eventually arrived in Paris on June 30.

At their fateful meeting in Paris, it is related that neither Levine or Kartveli could speak the other's language but Kartveli's design studies must have impressed the shrewed but mercurial millionaire. Levine immediately invited Kartevli to work for him at Columbia Aircraft Corpn. Although the Columbia prototype designed by Kartveli was destroyed in a hangar fire, his abilities and qualifications soon earned him a post with Fokker (Atlantic Aircraft Corporation) at their New Jersey plant.

Meanwhile, the dashing Major de Seversky (U.S. Army Reserve rank; the "de" style adopted while in France) had not enjoyed any great success with his original enterprise. So, in February 1931, he formed a new company, Seversky Aircraft Corporation, and obtained sufficient financial backing to engage in limited aircraft design and construction. Not only was Seversky founder and president of the new company, but also chief designer and test pilot.

Having met Kartveli and established a friendship through a common bond of language and origin, it was natural that Serversky should invite Kartveli to join him in the venture. Kartveli began as assistant chief engineer but soon assumed prime responsibility for all designs.

Alexander Kartveli: aircraft designer extraordinary. Born 9th September, 1896, this picture was taken in his seventieth year. (Photo: Republic)



Seversky's first export order—1935—was for three SEV-3M-WW reconnaissance amphibians for the Colombian Air Force.

The initial design constructed at their Farmingdale, Long Island, plant was an exciting-looking, three-place, radial-engine amphibian monoplane, which it was hoped would have appeal to both civil and military markets. Known as the SEV-3—an abbreviation of Seversky: three-place—it was to appear in a number of guises as its creators sought to gain orders for their business. First flown by Seversky in June 1933, the SEV-3 went on to give many demonstration flights—including establishing at 230 m.p.h. an amphibian speed record, Detroit, September 15, 1935—before being returned to the factory only to re-appear with floats replaced by a panted or trousered main undercarriage and big spatted tailwheel. The civil market for the SEV-3 (registration X-2106) could not give the company sufficient orders to consolidate it as a viable aircraft manufacturing concern.

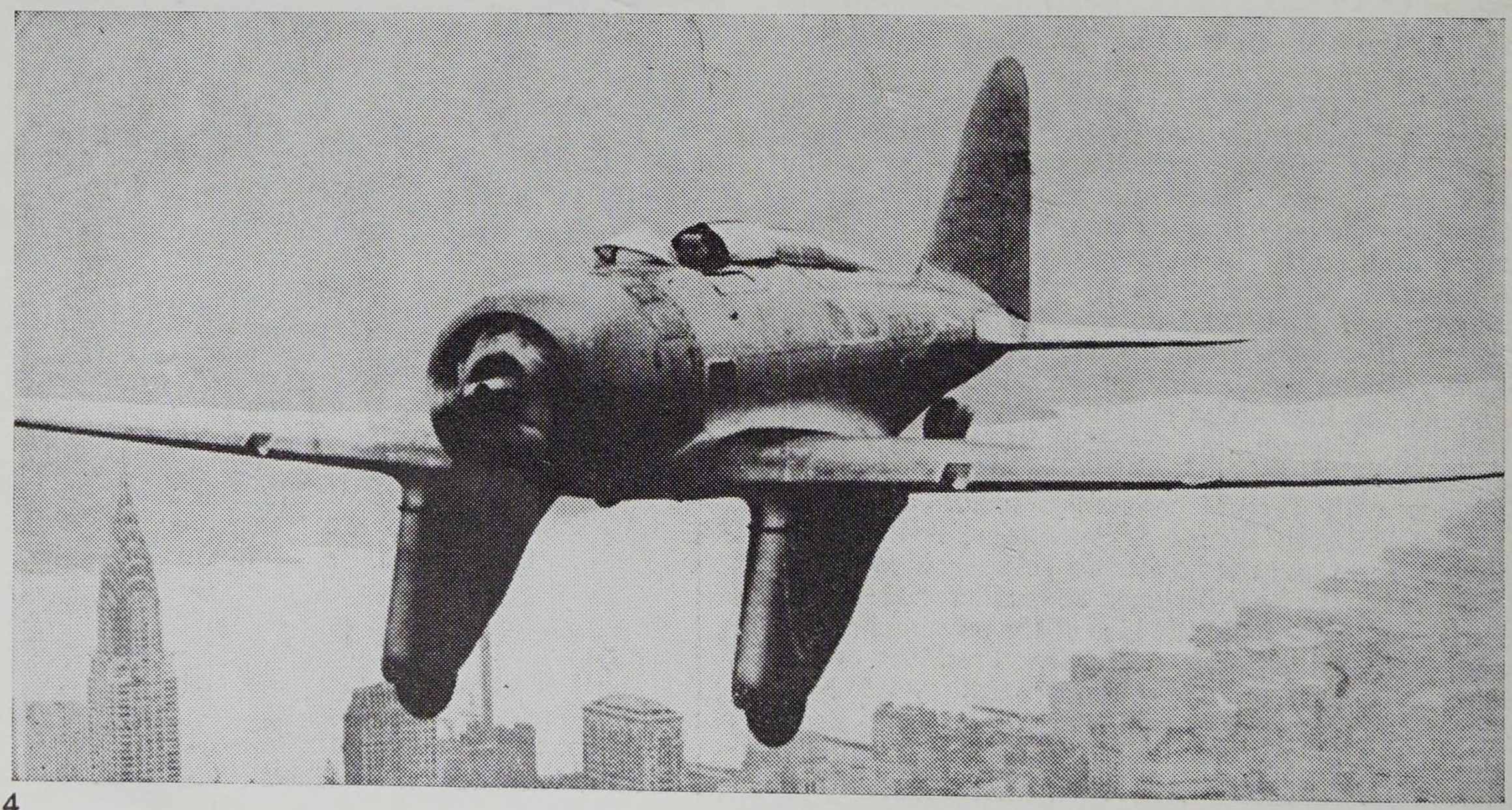
In common with most manufacturers of that time, Seversky kept a watchful eye on the military scene, for though the limited funds available to the U.S. Army Air Corps and U.S. Navy saw their purchase of new types as few and far between, such orders were very much a lifeline in the 'make-or-break' existence confronting small aircraft companies in the United States.

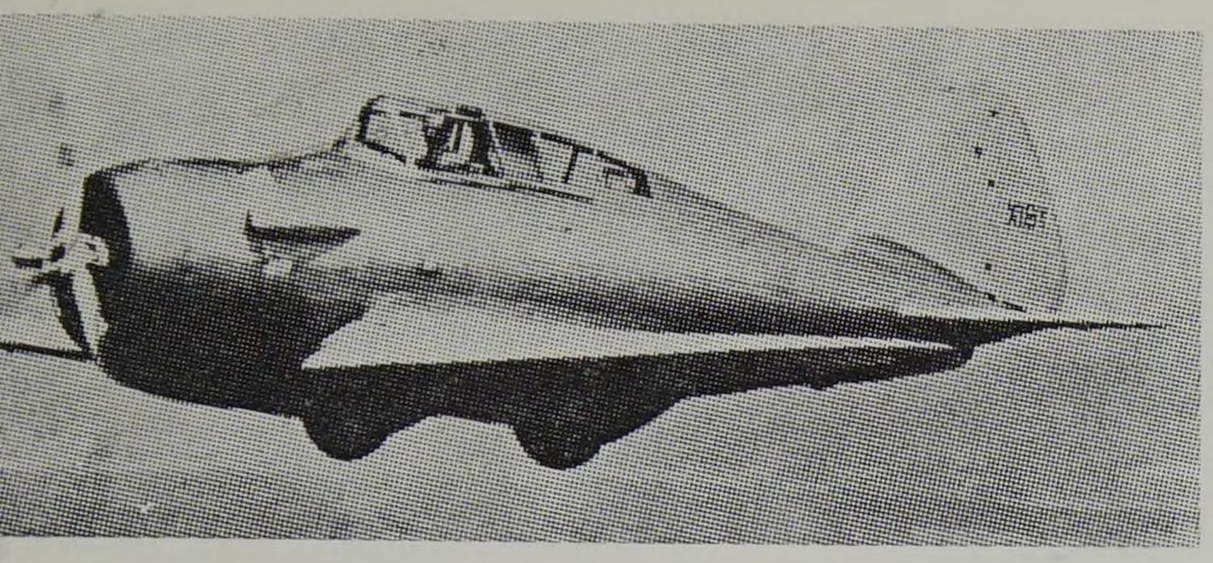
The Army Air Corps Materiel Division made a practice of issuing design competitions for aircraft to meet a specific requirement, and it was up to interested manufacturers to submit a tender and prototype by a given date. Thus, in 1935, when the Air Corps announced a requirement for a monoplane-type standard basic trainer, Seversky Aircraft Corporation lost little time in adapting the pioneer SEV-3 design to accord with the Army's specification. For Seversky, winning this competition and being awarded an initial contract for 30 BT-8s (U.S.A.A.C. classification: Basic Trainer Type Number Eight) was an historic event.

Meanwhile, in the previous year, the company had set about building a second design, a two-seat monoplane much along the lines of the SEV-3 and designated SEV-2XP (Two-place Experimental Pursuit). The SEV-2XP was evolved to meet an Air Corps requirement for a pursuit competition scheduled for June 1935. Unfortunately, while being flown from Farmingdale to the Army's test establishment for evaluation, the SEV-2XP was damaged in an accident and, in this original configuration (and designation), it was never tested at Wright Field, Dayton, Ohio.

During repair the opportunity was taken to advance the design by installing a rearwards retracting main undercarriage and to rework the cockpit for single-seat operation. Suitably modified, the prototype re-emerged from the Farmingdale workshops as SEV-1XP in time to compete in the postponed pursuit competition at Wright Field in August 1935. The Air Corps found the Seversky SEV-1XP agile and pleasant to fly. They were particularly impressed by its endurance which permitted a range in excess of 1,000

The original SEV-3, with revised landing gear replacing the amphibian twin-float arrangement, photographed over New York in May 1934; Major de Seversky piloting. Rudder bore the civil (restricted, experimental) registration X-2106. (Photo: Air-Britain archives via Charles W. Cain)





SEV-1XP over New York—carries restricted experimental civil registration X-18Y on rudder. (Photo: Republic)

miles at 250 m.p.h. Top speed fell short of the 300 m.p.h. objective of the manufacturers, the best figure obtained being 289 m.p.h. The 850 h.p. Wright Cyclone radial engine gave problems and possessed insufficient power. Even so, the Air Corps engineers preferred the aircraft to that of its competition rival, the Curtiss 75. Once more there were delays—this time because of the valid complaint (by Curtiss) that Seversky had been unfairly allowed extra time to enhance their entry. By the time the pursuit competition was opened again in April 1936 two other contenders—Consolidated and Vought—joined the Curtiss and Seversky at Wright Field.

In the intervening months Kartveli had substituted an 850 h.p.-rated Pratt and Whitney Twin Wasp radial for the Cyclone and installed revised shape tail surfaces and incorporated other refinements which carried the Air Corps' decision in the SEV-1XPs favour. An order for 77, to be designated P-35 (Pursuit type number 35), was forthcoming from the War Department in 1936 worth $1,636,250; with delivery taking place between July 1937 and August the following year.

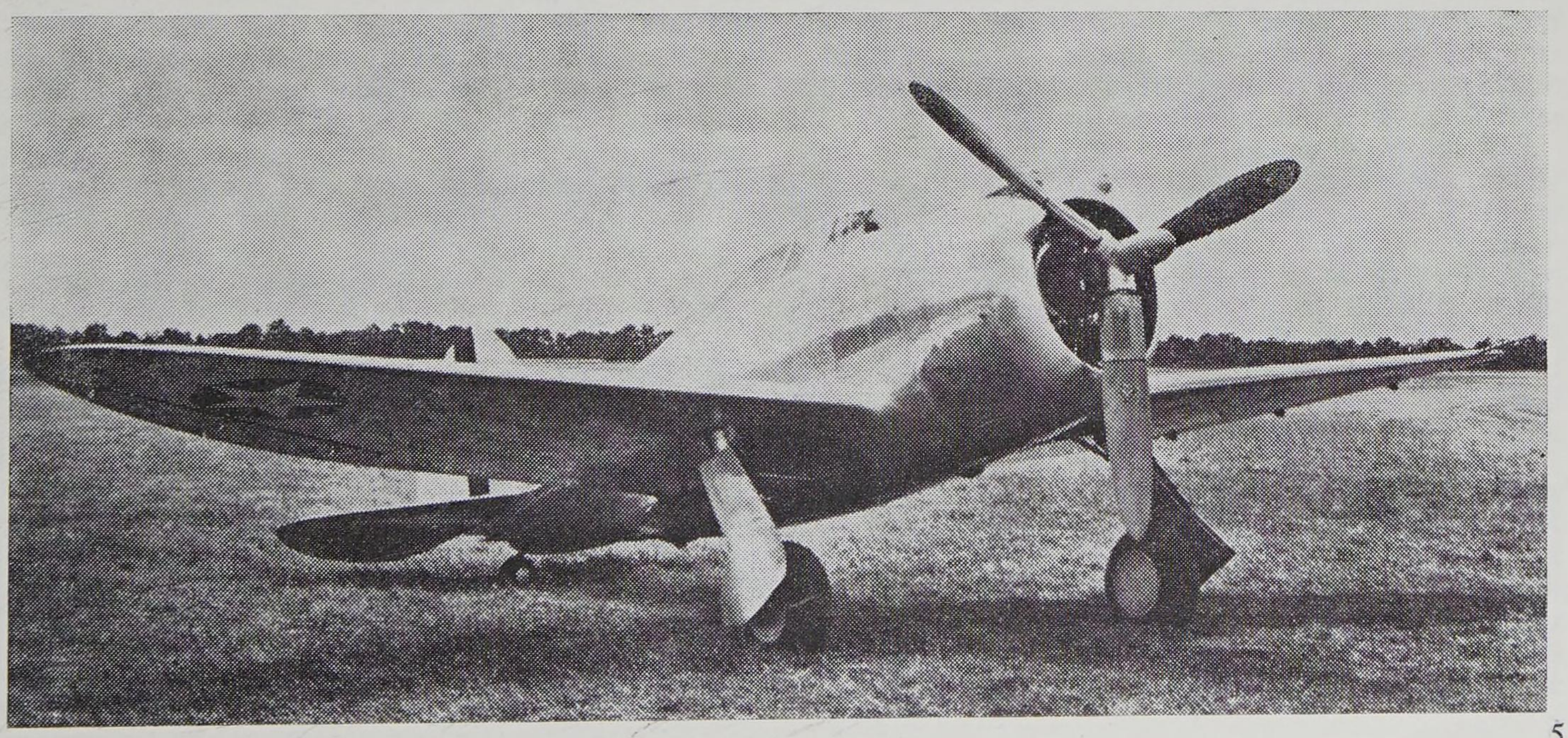
Probably the most advantageous feature of the P-35 was its then outstanding range of 1,150 miles; some 400 miles better than any of the competing designs in the competition and three times as great as the Boeing P-26 and other Air Corps' pursuits then in squadron service. Good range potential was advocated by Seversky and became an inherent feature of the later designs which, following the financial boost from the P-35 order, came with imaginative profusion as the company sought new outlets for business. Its first sales had been a few amphibians to Colombia and in 1937 a successful transaction with Japan resulted in 20 Seversky 2PA-L two-seat fighters being delivered in 1938. Intended for bomber escort the Japanese found the 'convoy fighter' heavier and less manoeuvrable than expected and eventually employed the 2PA-L on reconnaissance duties over the Chinese battle fronts. In the same year an export order was obtained from the Soviet Union for two examples of similar two-place fighters, one an amphibian, an order that must have given the two emigre Alexanders from Georgia a special satisfaction.

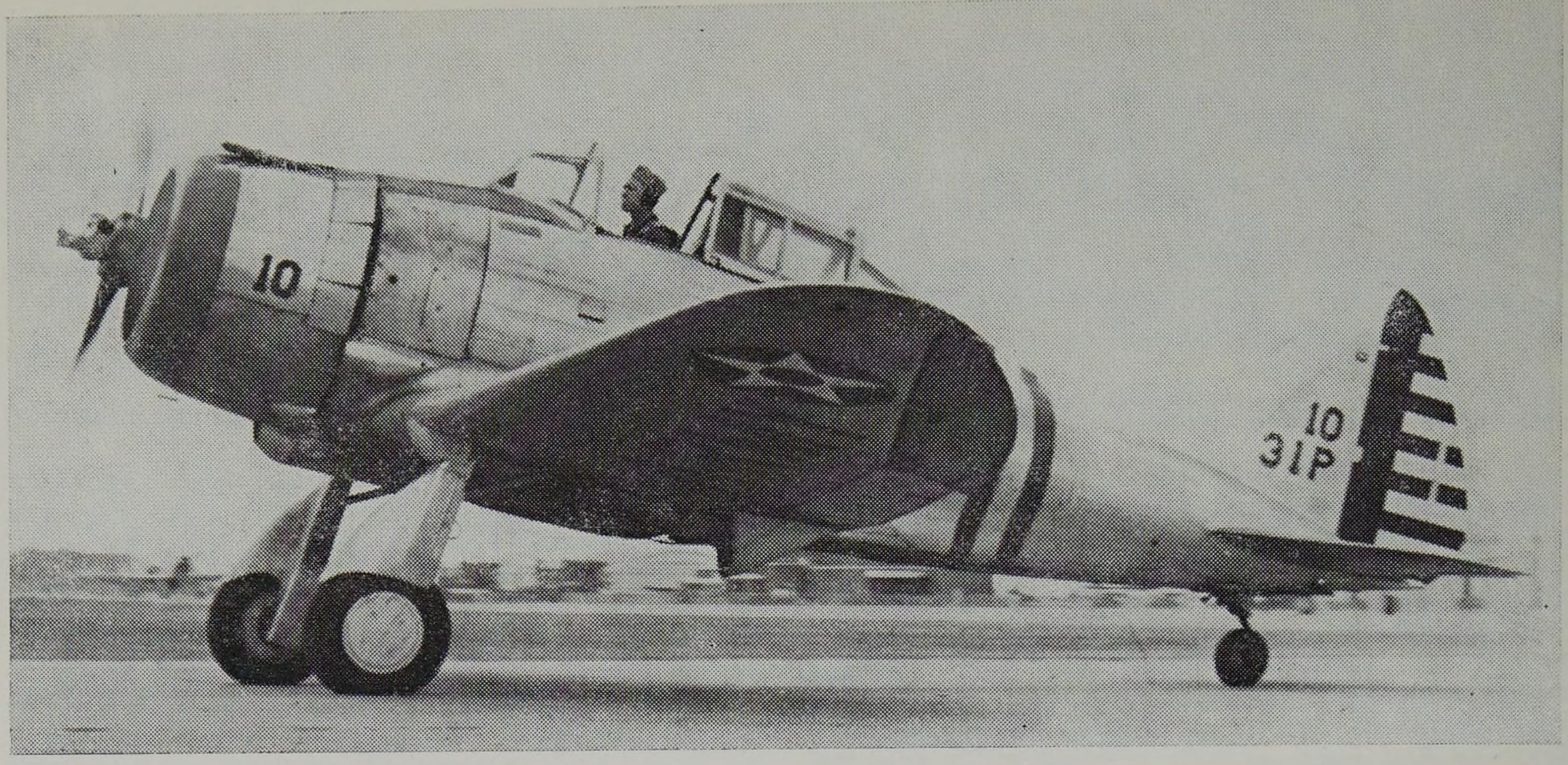
The Company was not slow in appreciating the potential market for military aircraft in Europe, where a civil war raged in Spain and a resurgent Germany had a massive rearmament programme in progress. But, spurred by the fear of war, the development of fighter aircraft had proceeded apace with the major powers, Britain, France, Germany and Italy, the Seversky monoplane was generally inferior in both performance and equipment to its European contemporaries. Only Sweden showed real interest in the export variant of the P-35 demonstrated to them in 1938, and they were similarly approving of a two-seat version that followed—this latter demonstration model was destroyed in an accident in England on the first day of April 1939.

In the civil field, Seversky gained considerable prestige from the many speed records obtained with non-military variants of the P-35. In September 1937, the Bendix Air Race, a premier event in the United States aviation calendar, was won by Frank W. Fuller in a Seversky which he flew from Burbank, California, to Cleveland, Ohio, averaging 258 m.p.h. The same year, Jacqueline Cochran broke the women's international three-kilometre record during the Detroit National Air Show in a similar Seversky at an average speed of 293 m.p.h. On one lap Miss Cochran reached 304·7 m.p.h., a sensational figure at a time when many Air Corps and Navy pursuits had top speeds around the 200 m.p.h. mark. Miss Cochran went on to win the 1938 Bendix in a Seversky, and the following year another P-35 derivative took first place for the third year in succession. These and similar achievements did much to advertise the combination of high cruise speed and range inherent in the Seversky monoplanes.

All these aircraft, export and racing models, were

The first YP-43 (Photo: Republic)





A P-35 of the 31st Pursuit Group, which was based at Selfridge Field, Michigan in 1940. (Photo: F. C. Dickey)

based on the same primary design and powered either by Wright or Pratt & Whitney radial engines. This exploitation of the basic airframe made good business sense in a small aircraft manufacturing concern by making maximum use of special construction jigs, obtaining better return from labour through increasing familiarity with components which brought enhanced expertise and smoother production. Even so, and despite the Company's successes in obtaining further orders from the Air Corps and abroad, the huge cost of running such an enterprise began to tell. By 1939 the financial aspects loomed large and could only be settled by new capital. The money was found but the investors were naturally entitled to reorganise the company as they saw fit.

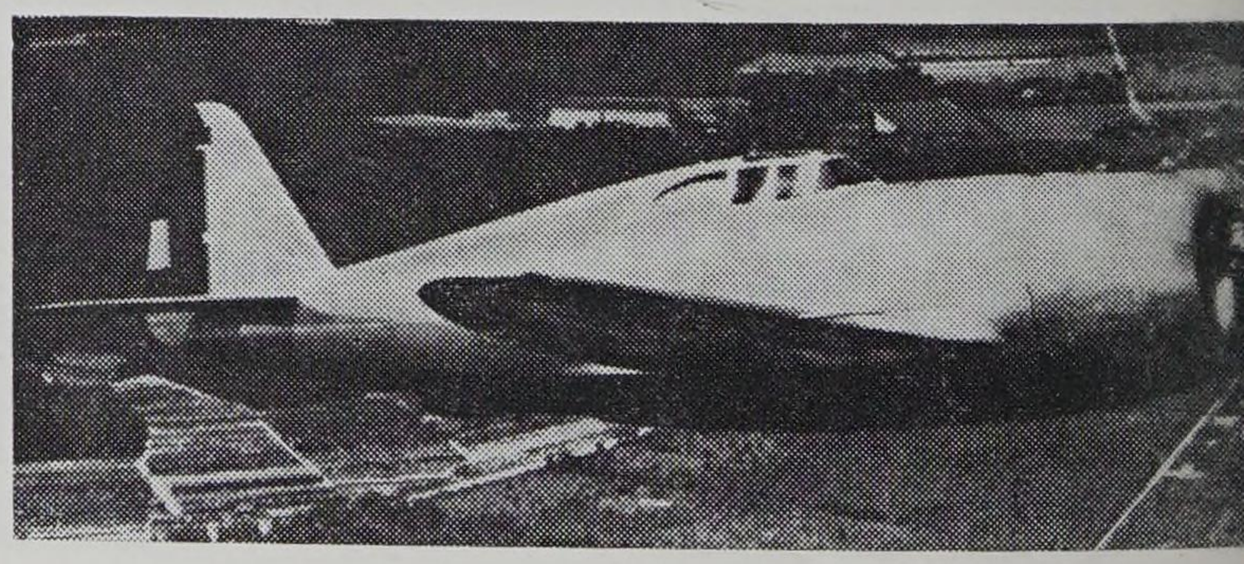
This culminated in Major de Seversky relinquishing his presidency and William Kellett (a former vice-president or director) being appointed in his place. Ironically, from then on the Company never looked back, as in the same month Sweden placed the largest order so far received for Seversky aircraft; 120 fighters of the P-35 type.

The design team remained much the same and Kartveli continued as chief engineer, still pursuing the policy of advancing his basic airframe. With the troubled world scene, even the isolationist United States was moved to strengthen its armed forces, and more funds were made available for equipment.

The success of the P-35 was short-lived for the Air Corps soon approved and ordered a Curtiss fighter (as P-36) based on the earlier Curtiss 75, which had a better performance than the P-35 in practically all respects except manoeuvrability and range. Speed was the chief criterion of pursuit design and Kartveli looked for means of obtaining 300 m.p.h. from his basic airframe. Airframe manufacturers constantly demanded more power for their designs and promoted the accelerated development of aero-engines. By 1938 Pratt & Whitney had an upgraded version of their Twin Wasp radial capable of producing 1,150 h.p. and available with an integral supercharger to help maintain power in the rarified air at altitude. More power was only one answer for faster speeds; the other was a cleaner airframe. Obvious target was the replacement of the almost totally exposed rearwards-retracting main undercarriage by a completely flush-fitting inwards-retracting assembly. Both these improvements were proposed to the Air Corps who scheduled the last production P-35 airframe to incorporate these features, and giving the prototype a new type designation, XP-41.

The XP-41 was completed early in 1939 and turned over for testing at Wright Field in February of that year. It could reach better than 320 m.p.h. at 15,000ft. and retained the P-35s advantages in manoeuvrability and range. However, the Air Corps considered that the advance over its forebear was insufficient to warrant production. They were, in any case, more interested in an alternative private venture development by the Company which had a turbo-supercharger to boost altitude performance still further. As altitude increases the air density decreases and offers less resistance to an airframe being propelled through it, with consequent opportunities for higher speeds. Against this advantage, the thinner air provides insufficient oxygen for a maximum-power combustible mixture to be fed by the carburettors to the engines. In other words, the higher an aero-engine is taken, the less oxygen there is available and the greater the fall-off in power. Hence the application of superchargers, which compress air to a density equal to sea-level conditions and feed it to the engine to enable low altitude power to be obtained at high altitude. The geared supercharger fitted to the XP-41s engine had its limitations whereas the turbo-supercharger—which used engine exhaust gases to work the air compressor

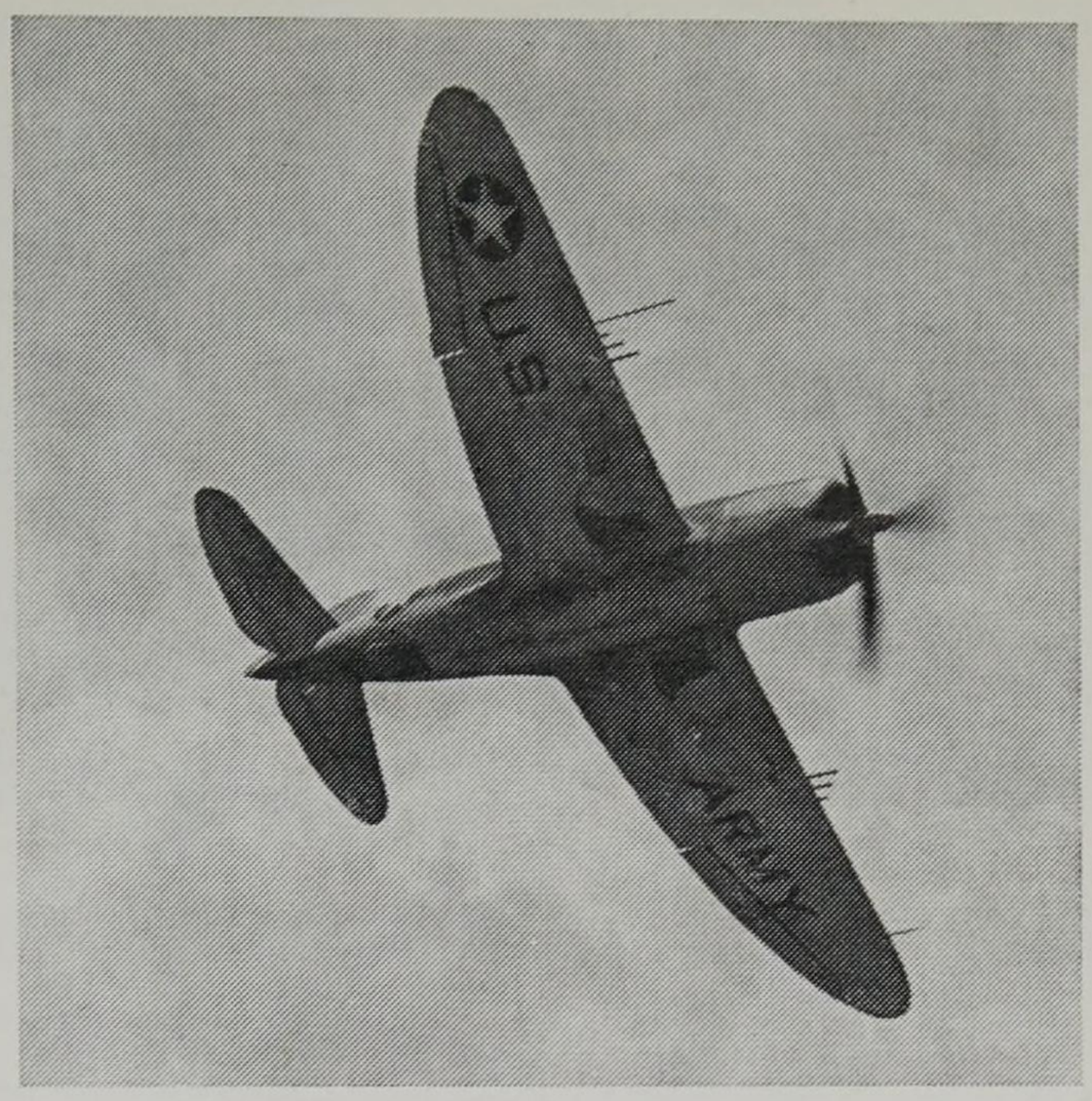
The XP-47B, May 1941. According to Kartveli, the basic sketch of this fighter was drawn on the back of an envelope at a meeting at Wright Field in 1940.



—offered much better possibilities for improved performance. Kartveli's team appreciated that it was in the upper atmosphere that they could best seek to enhance the speed and agility of their basic airframe. The turbo-supercharger was both bulky and heavy and its installation in the airframe was not easily accomplished. It was installed in the fuselage at a point near the centre-of-gravity, with ducting to and from the engine and a waist gate to expel the used exhaust gases under the fuselage amidships. This aircraft was known by the company designation AP-4 (Army Pursuit number 4) and was delivered to Wright Field for testing in the same month as the XP-41. Flight trials produced top speeds in the region of 350m.p.h. at 20,000ft., and the AP-4 could be taken up to 38,000ft.

In March 1939 an order for 13 service test models—under the designation YP-43 (the Y indicating test)—was forthcoming from the Air Corps who, with a number of other promising fighter designs in view, would not be committed to large-scale production orders at this juncture. Other American manufacturers were turning to the new Allison liquid-cooled engine to power their fighter designs because of the combination of high power output and small frontal area offering better streamlining prospects than was possible with radials. Early liquid-cooled engines required extremely large water-cooled radiators that were an obstacle to good aerodynamics. The new coolant, Glycol, which became available in the 1930s, had better heat dispersing properties and allowed the use of radiators of much smaller dimensions. At this time both the Air Corps and the U.S. aircraft industry were beginning to wake up to the advances in fighter development evident in Europe, where the advanced designs such as Hurricane, Spitfire, D520 and the Bf 109 all employed liquid-cooled motors. Nevertheless, it is noteworthy that the evaluation officers at Wright Field refused to put all the (pursuit) eggs in one basket; perhaps the result of some personal experience with the troublesome early liquid-cooled engines against the comparative reliability of radials.

Seversky Aircraft Corporation, however, could not ignore the potential of the new Allison 'Vee'—a popular term for liquid-cooled engines where cylinders were arranged in two banks, V-positioned to the crank case when viewed head-on. During the summer of 1939, Kartveli worked on a completely new design proposal featuring the Allison as a powerplant and with an airframe of similar weights and characteristics to European trends in interceptors. This proposal for Seversky model AP-10 was submitted for evaluation in August 1939, a few weeks prior to Hitler's invasion



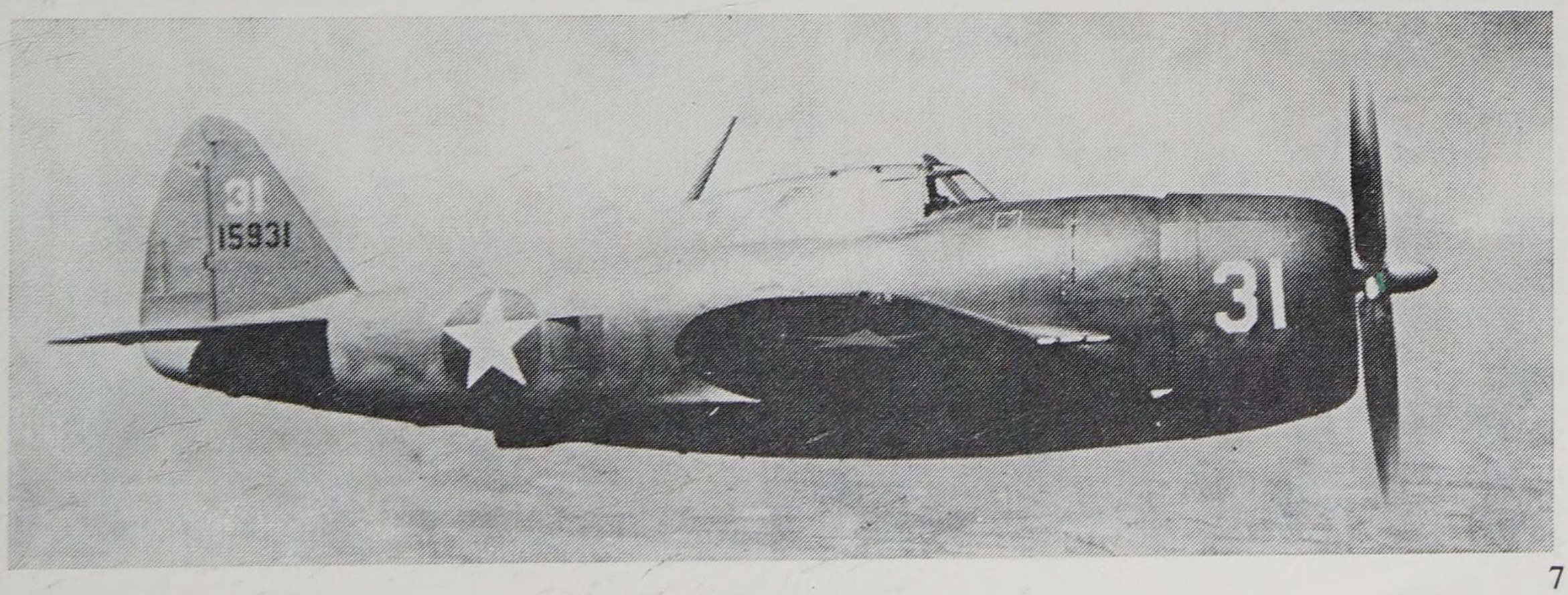
The XP-47B over Long Island in July 1942. It was destroyed in a crash the following month. (Photo: U.S.A.F.)

of Poland and Britain and France becoming involved in the conflict known as the Second World War.

The Army Board convened to evaluate AP-10 recommended that, while they did not consider it suitable for production, it possessed sufficient desirable characteristics to warrant further investigation as an experimental aeroplane. Basically, Kartveli had set out to design an extremely lightweight interceptor, with about the smallest airframe that could be built around the Allison. The Experimental Engineering section of Wright Field then went to work on the design and made detail changes which included raising the weight from 4,600–4,900lb., and increasing the wing area from 110–115sq. ft. Provision was also made for bomb racks under the wings. Armament remained as originally proposed by Seversky, namely, one 0·50in. and one 0·30in. machine-gun, fuselage mounted. Top speed was to be 415 m.p.h. obtained at 15,000ft. and it had to reach this height from take-off in 3½ minutes.

A contract was prepared in early November and this provided for two prototypes under the designations XP-47 and XP-47A. The XP-47A was to be identical with XP-47 except that it was to be delivered first, within nine months, and would be devoid of

A P-47B used by the 56th Fighter Group, on a training flight during September 1942. The forward raked aerial mast was a distinctive feature of this model.

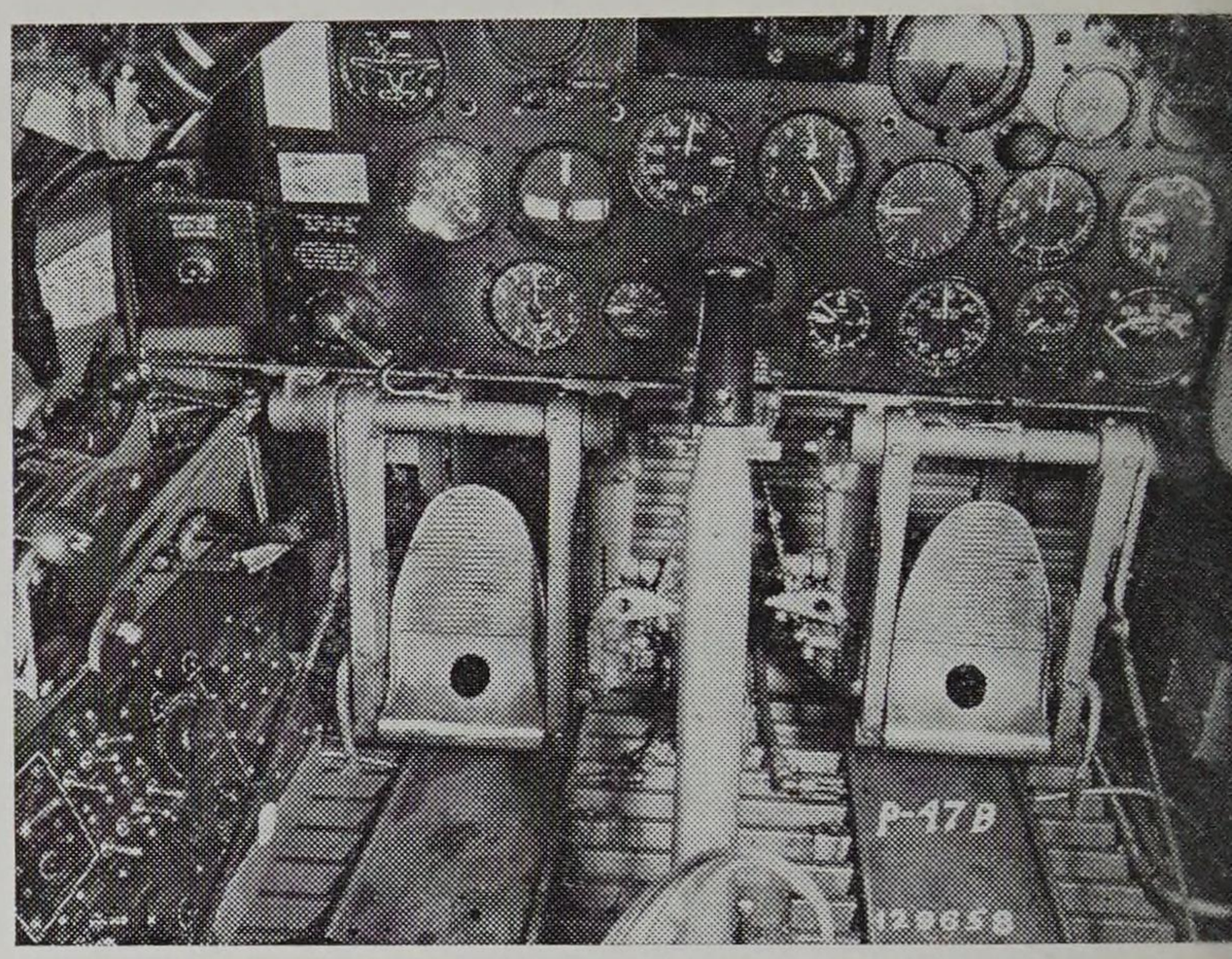


The P-47C was, apart from the aerial mast, visually very similar to the B model. The turbo-supercharger exhaust under the rear fuselage and intercooler doors can be clearly seen in this photograph. (Photo: U.S.A.A.F.)

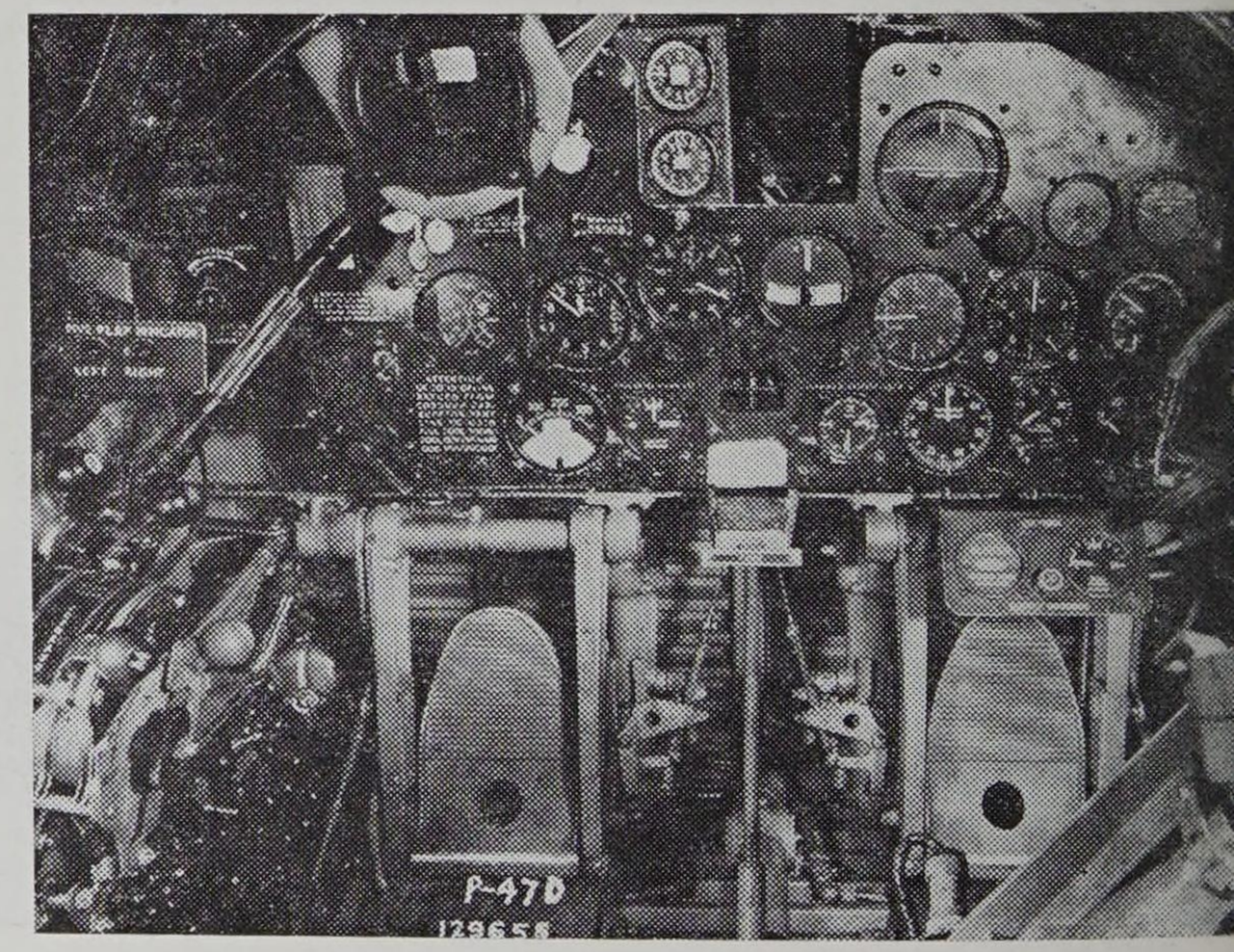
armament, radio and other tactical equipment so that flight testing could be accomplished ahead of the fully combat-equipped XP-47. The contract was not approved, for the authorising agency in Washington, D.C., considered the XP-47 had insufficient firepower; also, it possessed too high a wing loading and too low a top speed—to justify the two other points of objection when compared with a contemporary Curtiss fighter (the XP-46). As a result of the rejection of the contract a number of discussions between the designers and the Air Corps engineers led to a still larger aircraft with wing area increased to 165sq. ft. Firepower was increased to a pair of 0·30in. machine-guns in each wing and two 0·50s in the fuselage synchronised to fire through the propeller arc. The design weight had advanced to 6,150lb. but a top speed of 400m.p.h. at 15,000ft. was still expected although the time to that altitude was extended to $4\frac{3}{4}$ minutes. A new contract was prepared and approved in January 1940.

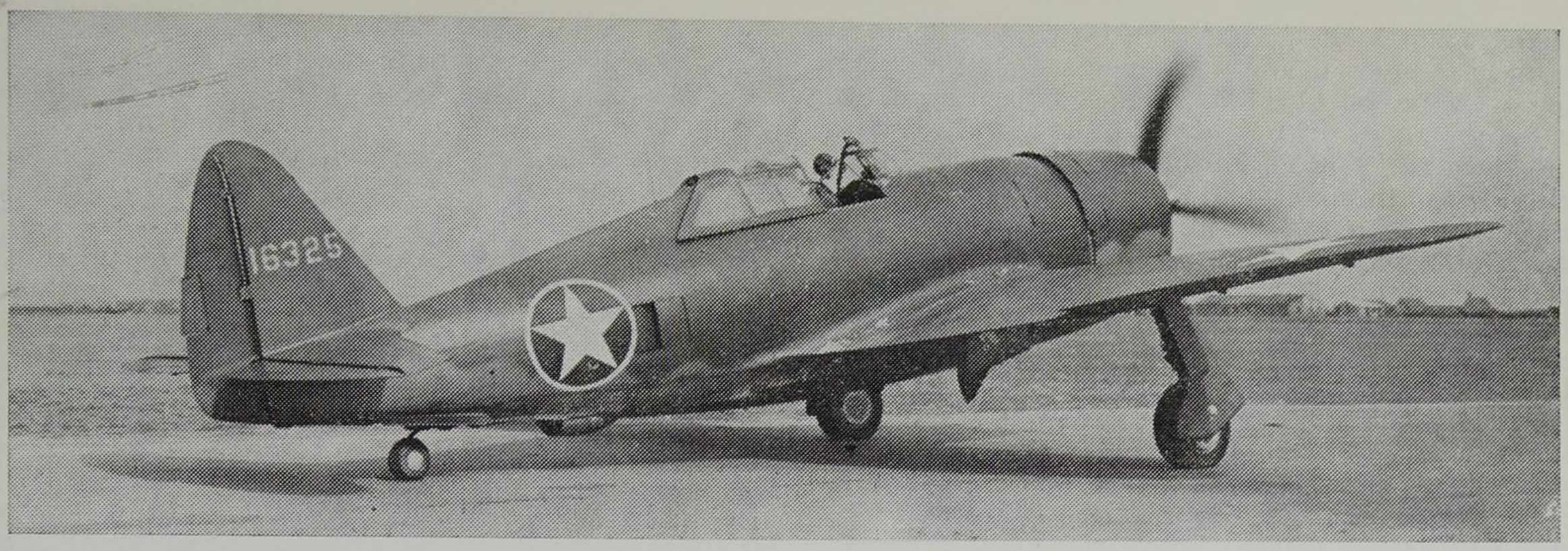
By then, the United States aircraft industry was expanding not only on the strength of orders placed by a wary government but through large orders from foreign powers, notably Britain and France. While the European air experts who came to evaluate the designs were admirers of the sound construction and good flying qualities of most U.S. aircraft, they were critical of their value as being combat-worthy. The same sentiments were echoed by official U.S. military observers who had visited the war fronts in western Europe, albeit that the storm had yet to break. By the early months of 1940 the message had begun to have some effect upon Air Corps leaders; that their aircraft were generally completely deficient in firepower, protective armour for aircrew and vulnerable components, and lacking many of the technical advances such as self-sealing fuel tanks. Nowhere were these weaknesses so marked as in the pursuits available. The standard Air Corps pursuit of the late 1930s was an old-fashioned, two-gun cowboy, whereas the British equivalent was a steel-helmeted, battle-dressed soldier armed with automatic weapons.

Within a month of approving the contract for the XP-47, the Air Corps Materiel Division wrote to the manufacturers—who had changed the name of their company to Republic Aviation Corporation in October 1939—requesting their estimate of the effect



Cockpit views of P-47B 41-6038 and P-47D-2-RE 42-8009, showing the growth and re-positioning of instruments. Power control quadrant is on left side with electrical switching below. This particular P-47D was experimentally fitted with dive flaps and has a special tachometer in this connection (upper left central). (Photos: U.S.A.A.F.)





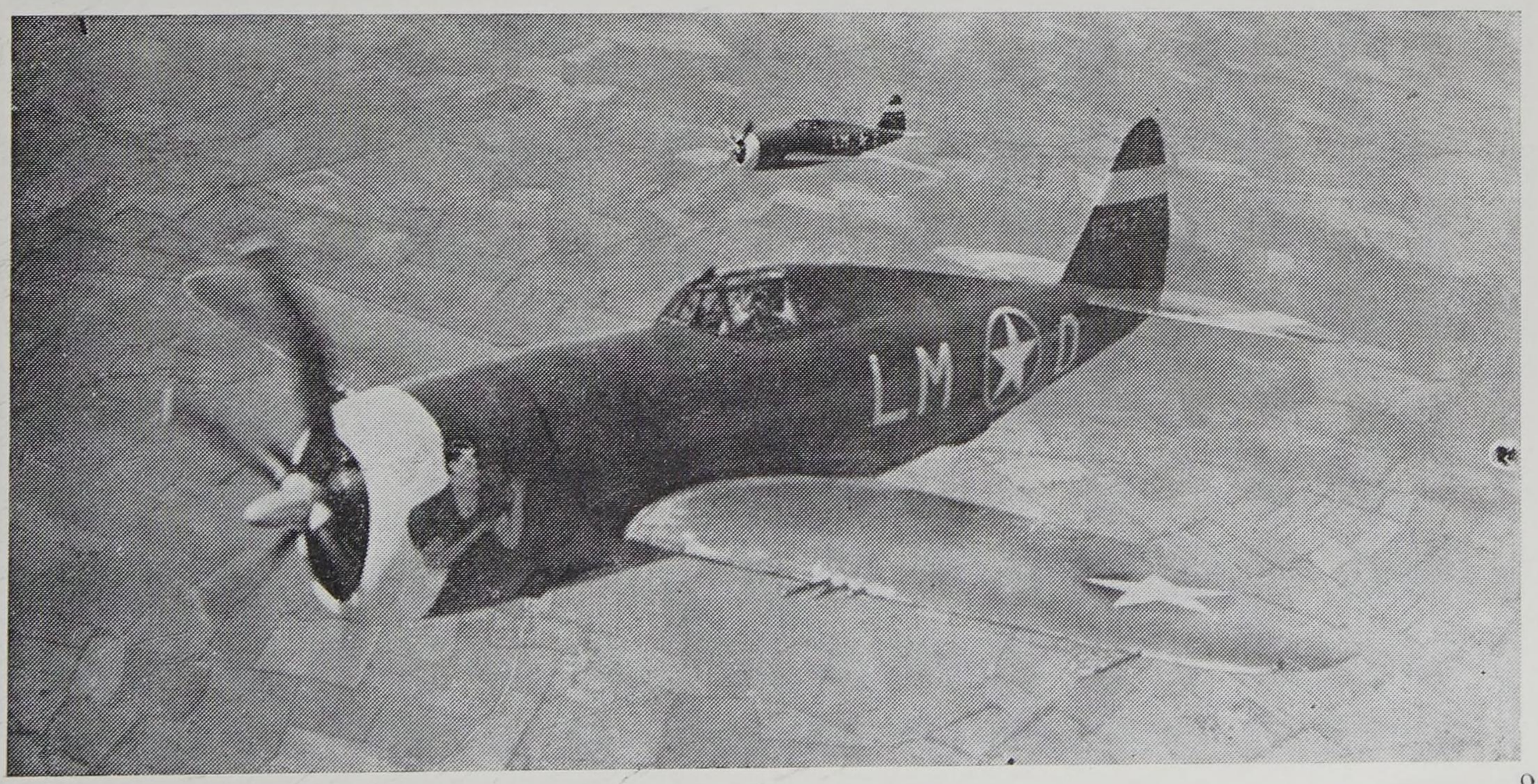
One of the first P-47C-5-REs to arrive in the U.K. taxiing along the perimeter at Atcham Airfield. (Photo: U.S.A.A.F.)

of incorporating self-sealing tanks, pilot armour and other war equipment. On February 27, 1940 Republic replied that this equipment would entail adding an extra 5sq. ft. of wing area to maintain the specified wing loading since the gross weight of the aircraft would increase by 200lb. Climbing time and take-off and landing runs would be affected and provision for carrying underwing bombs would have to be eliminated. Further, most of the engineering work already undertaken would have to be scrapped, delivery of the prototype would take an extra 45 days and the cost of the changes was estimated at $15,000. Further correspondence and discussion ensued and once more the plan for XP-47 was revamped. Total weight increase would be 250lb. and the prototype would be delayed 60 days.

Concerned at the shortcomings in its pursuits highlighted by developments in Europe, the Air Corps convened a special Board to consider the whole question of fighter design and procurement. By May 1940, it was apparent that its members were not satisfied with XP-47 which seemed likely to have difficulty in meeting a specification that was already near to being outdated. The Board also considered that too great a proportion of the current pursuit programme was dependent upon the satisfactory development of the Allison engine and that work on pursuits making use of air-cooled or other types of liquid-cooled engines should be expedited to the full.

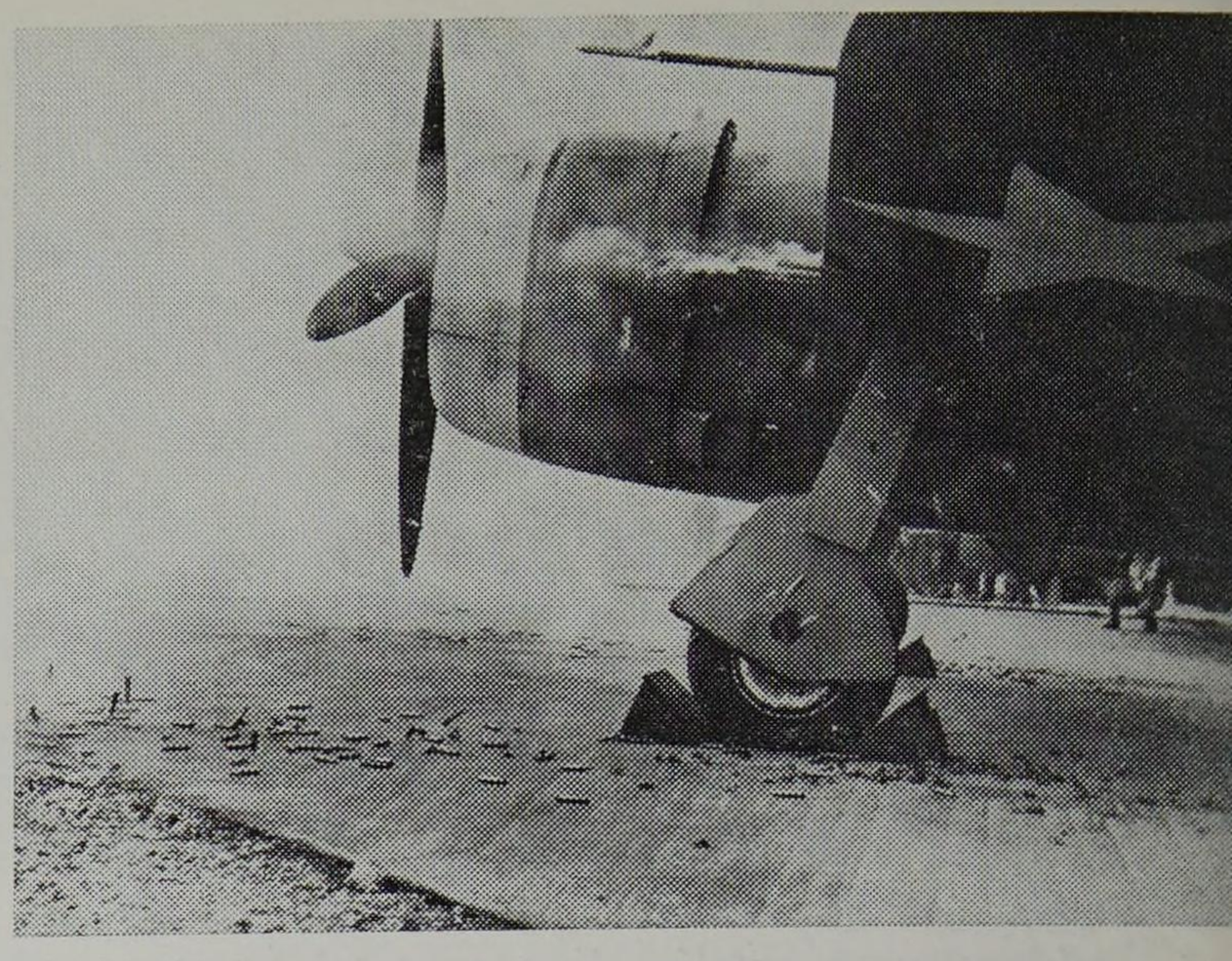
Anticipating the death knell for XP-47, Republic turned their attention to the use of Pratt & Whitney's new radial, the XR-2800 Double Wasp, which offered 2,000h.p. This large engine had already been considered as a power plant for a projected version of AP-4, the Company's basic radial-engine fighter airframe, but this had not been proceeded with—indeed the airframe that had evolved from old SEV-1XP had just about reached the limit of its development as a pursuit vehicle. As XP-47 was far too small to take the Double Wasp, it was obvious that Kartveli must design a completely new airframe if this powerful engine was to be employed and all the special paraphernalia of war incorporated without difficulty. On June 12, 1940, a date which saw a triumphant German army on the French coast, Republic Aviation submitted a revised specification for their XP-47 contract, which substituted a Pratt & Whitney R-2800 radial for the Allison V-1710 originally planned. The characteristics given for this, the XP-47B model, were a top speed of 400m.p.h. at 25,000ft., reducing to

'Lil Abner', 41-6347, of the 62nd Fighter Squadron, 56th Fighter Group, over Norfolk, England, May 1943. This aircraft was later transferred to a training group and survived until after hostilities ceased. (Photo: U.S.A.A.F.)

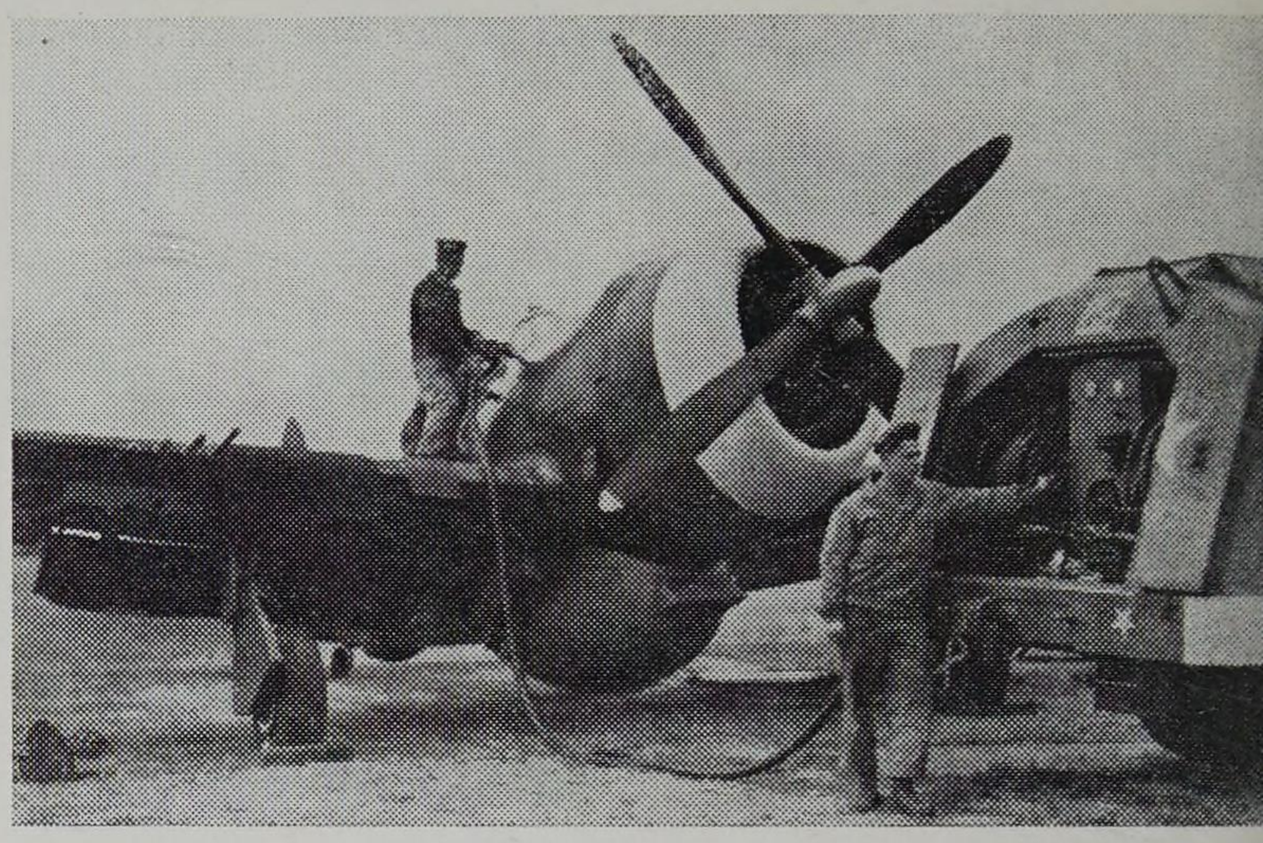


340m.p.h. at 5,000ft. Time to 15,000ft., five minutes; armament of six 0·50in. machine-guns, and a design gross weight of 11,600lb. A startling specification, considering that the weight was more than twice that originally projected for XP-47. Nevertheless, the high-altitude performance—and the proposed armament—was better than any other pursuit project currently under development for the Air Corps. U.S. observers had been impressed by the British eight-gun fighters but the weapons now proposed for XP-47B were not the 0·303in. rifle-calibre types of the Spitfire and Hurricane but the U.S. Army's heavy-calibre machine-gun which, although the rate of fire was about two-thirds that of the smaller weapon and the weight three times as much, the charge and bullets were larger, giving vastly superior muzzle velocity, range and penetration factors. Impressed with this high altitude interceptor, large and heavy as it was, the Air Corps approved the change, although not officially until September 6, 1940. In the meantime work on the XP-47 and XP-47A was terminated, and practically all engineering development plus the construction of certain detail parts were scrapped, in all amounting to some $60,000 in costs. A full-scale wind tunnel model of the XP-47 was in an advanced state of construction when plans were changed and it was decided to complete this and turn it over to the National Advisory Committee on Aeronautics (N.A.C.A.) at Langley Field, Virginia for use in investigating the general cooling requirements of the Allison engine.

The design problems facing Kartveli's team in that fateful summer of 1940 were nothing less than formidable. The aircraft they planned to build was unique in many respects and called for much ingenuity although the engineering experience gained over the many years with the Seversky monoplane pursuit would stand them in good stead. Visually, the XP-47B as projected by Kartveli was a stretched version of its radial forerunners. The elliptical wings and deep fuselage that characterised those designs were retained but the elongation gave the XP-47B a more refined and less dumpy appearance. Structurally, many of the proved methods employed on the early designs were repeated but for the most part the problems involved required new procedures. To attain better than 400m.p.h. at high altitude, a perfect ducting link with the huge turbo-supercharger was essential. As with the YP-43 the turbo-supercharger was placed in the fuselage aft of the pilot but to ensure the most efficient and least interrupted air flow to this unit, the ducting was designed first and then the fuselage built-up around it. This ducting for exhaust



'The Thunderbolt could sure fan lead'. An 84th Fighter Squadron P-47D on the Duxford butts, July 1943. The eight 0·50 inch calibre guns delivered 773 lb. of bullets per minute. Ejected cases and clips can be seen falling on the hardstand. (Photo: U.S.A.A.F.)



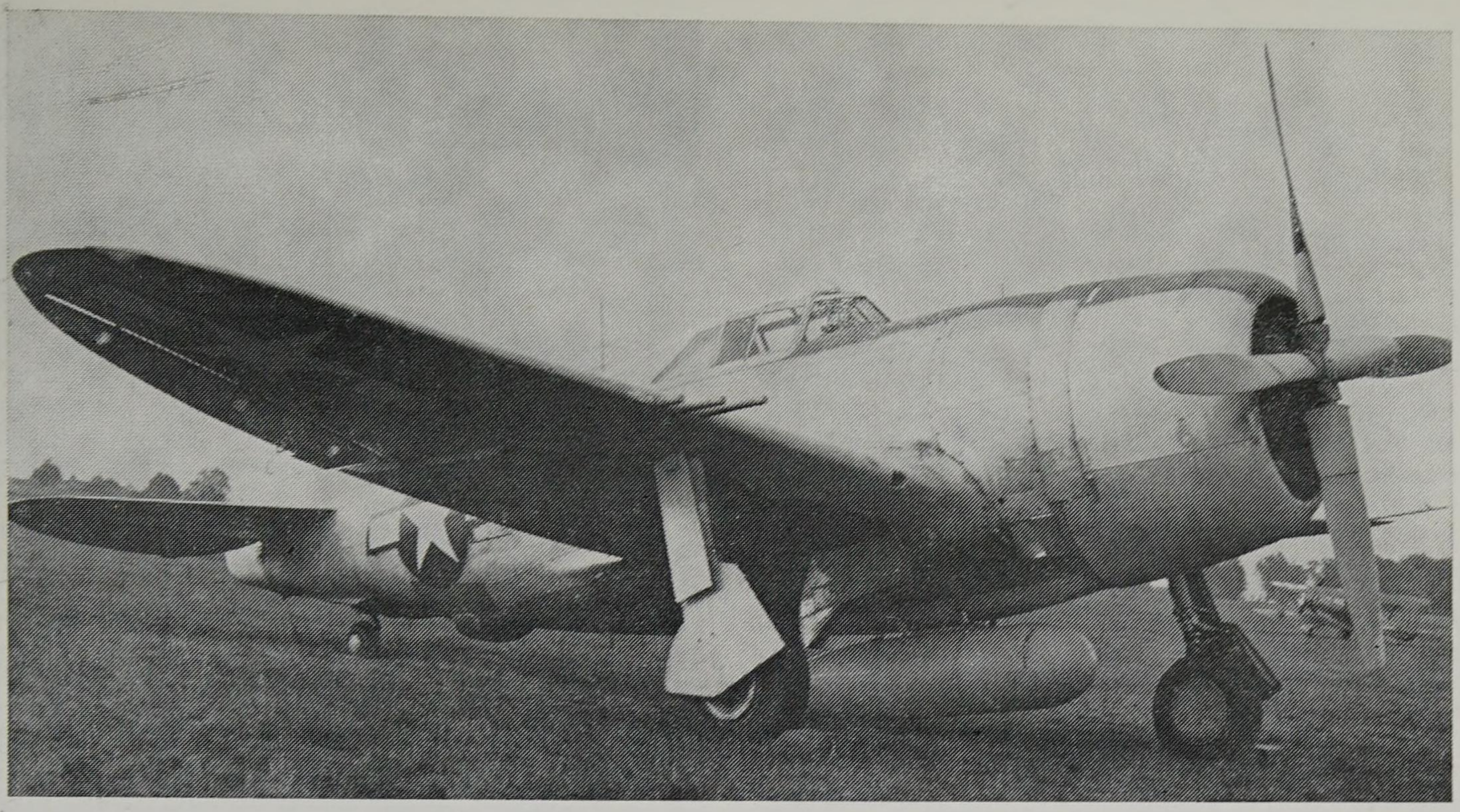
'Gassin' up'. This 83rd Fighter Squadron P-47C-5-RE has a 200 gal. ferry tank installed. Wedge aided release.

gases and air was arranged along the bottom of the fuselage and would come to have another important property, not envisaged by its designers.

To take full advantage of the power available and the gearing of the engine, a 4-blade controllable-pitch propeller was specified; the first for a modern U.S. military aircraft. This brought another problem as the 12ft. diameter of the propeller necessitated unusually long main undercarriage legs to obtain sufficient ground clearance. These, in turn, required

'Gassin' up'. A 354th Fighter Squadron P-47D-5-RE being replenished. Filling point, forward of cockpit, was into main tank. Drop tank is 108 gal. pressurised type.

355 FG



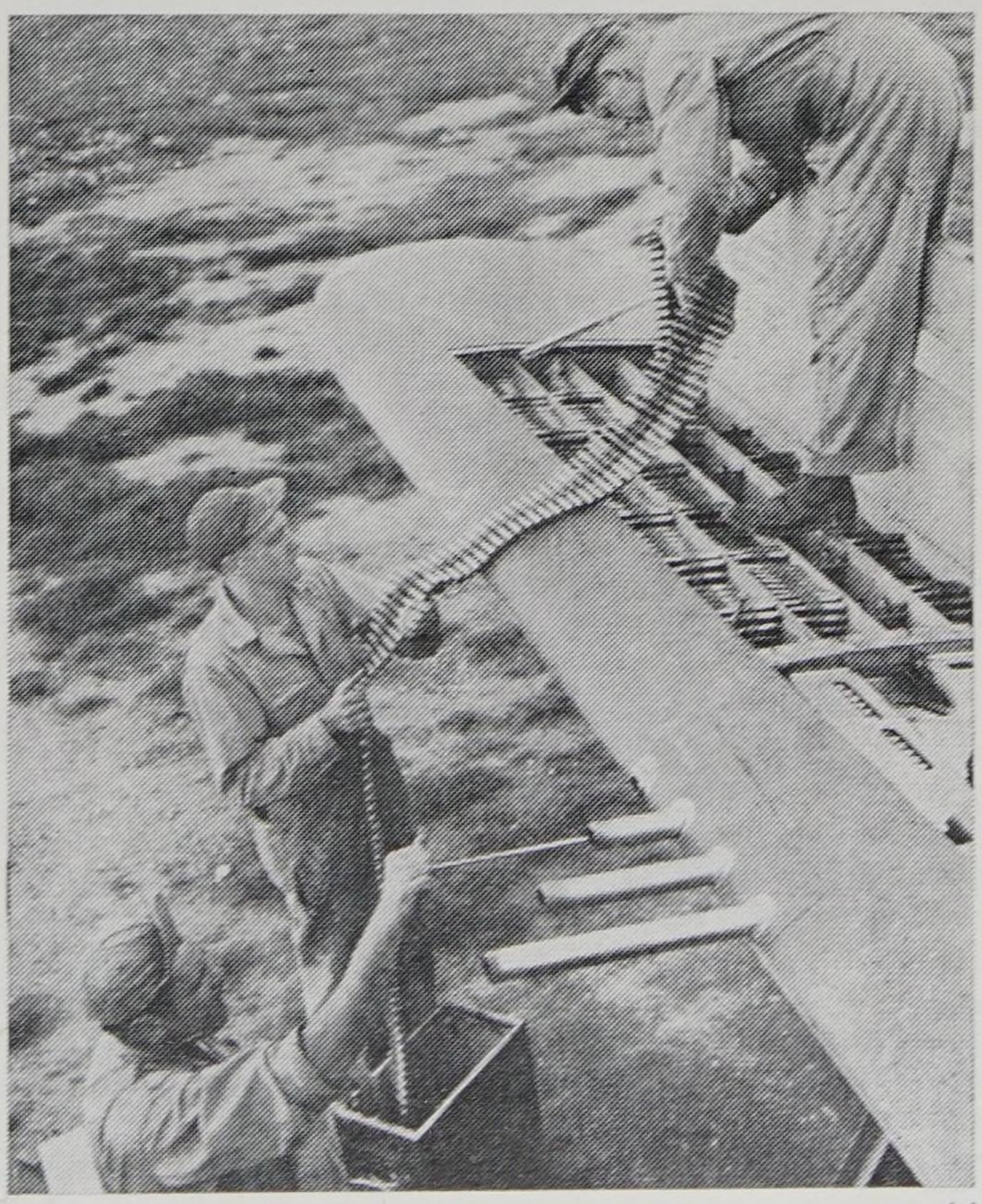
The first 'silver' Thunderbolt in an operational theatre. This P-47D-1-RE had all its camouflage removed to ascertain weight and performance advantages. VIII Fighter Command, Bovingdon Airfield, England, September 1943. (Photo: U.S.A.F.)

suspension points so far outboard on the wing that it would be impossible to instal the three or four wing guns specified. A solution was eventually found in a telescoping landing gear that would be 9in. longer when extended than when retracted and stowed in the wing. This arrangement allowed efficient wing structure and left room for the full eight-gun armament if required. The thirsty engine would require generous fuel tankage and furthering the company's reputation for building good endurance into its aircraft, two internal tanks were installed forward and below the cockpit with a combined total in excess of 300 U.S. gallons.

While design proceeded apace the probability of the United States eventual involvement in the European war appeared daily more certain. The President, Government and the military leaders were of this persuasion and plans for armament production and build-up of the armed forces were hurried. No longer did the aircraft manufacturers have to compete for orders; aircraft production facilities were now overburdened.

To bring the P-47 series into production required many months of preparation and expansion of the factory to meet the $56,499,923 order for 773 aircraft placed in September 1940. The fighter was, in fact, being ordered off-the-drawing-board before the prototype had flown and proved its worth. To keep the existing production lines active further versions of the YP-43 type were ordered under the designations P-43 and P-43A, both being similar but for more powerful engines. Even before they appeared they were considered as second-line aircraft to be relegated to operational training and other duties. The P-43 came to be known as the Lancer. The British policy of giving names to aircraft had caught on in the U.S.A., largely through those bestowed on U.S.-manufactured aircraft for the R.A.F. C. Hart Miller, Republic's Director of Military Contracts thought up Thunderbolt for the XP-47B and the Company approved this name. By May 6, 1941, when test pilot Lowry L. Brabham flew the XP-47B from the Farmingdale runway on its initial flight, the name Thunderbolt was already well known. A 'Thunderbolt March' was composed and a great deal of flag-waving ballyhoo attended the aircraft's debut. Across the Atlantic British newspapers and journals politely repeated the claims of 'fastest and best' without comment. The R.A.F., no doubt cautioned by its experience of American fighters so far received, remained slightly sceptical. From Germany came words of derision. The largest, heaviest, single-seat fighter the world had seen sat in a hanger at Farmingdale. The question now was would it come to justify the implications of its name?

Servicing the guns of a 78th Fighter Group Thunderbolt at Duxford. Individual ammunition compartments can be clearly seen. (Photo: U.S.A.F.)



THE 56th TROUBLESHOOTERS

SHORTLY after the Japanese attack on Pearl Harbour and the United States' involvement in war with the Axis powers, steps were taken to bolster the air defences around New York. The ingenuity of the Germans was such that it was not inconceivable, although highly unlikely in view of the distances involved, that some form of aerial attack could be mounted. Thus, in January 1942 some unknown Army Air Force officer made the decision to move a partly-trained fighter group of three squadrons to the New England coast area, starting a train of events that would come to have a special place in the history of aerial warfare.

The 56th Pursuit Group had been created a year before in sunny Carolina. Now it was to take its motely collection of Bell P-39 Airacobras and other fighter aircraft to the wintery north-east, settling one squadron at Bridgeport in Connecticut, another at Bendix, New Jersey, and the third on a newly prepared site at Farmingdale, Long Island, not far from Republic Aviation Corporation's plant. The Company was about to turn out its first production models of the Thunderbolt, its large radial-engine fighter, still officially secret but a good talking point for men of the 56th. The Thunderbolt was rumoured to weigh six tons, a weight which just did not make sense to the pursuit pilots. While the P-39s of the 56th flew patrols along the New England seaboard or were hurriedly 'scrambled' to meet unidentified aircraft, other decisions were being made by higher authority.

First Unit to Fly P-47

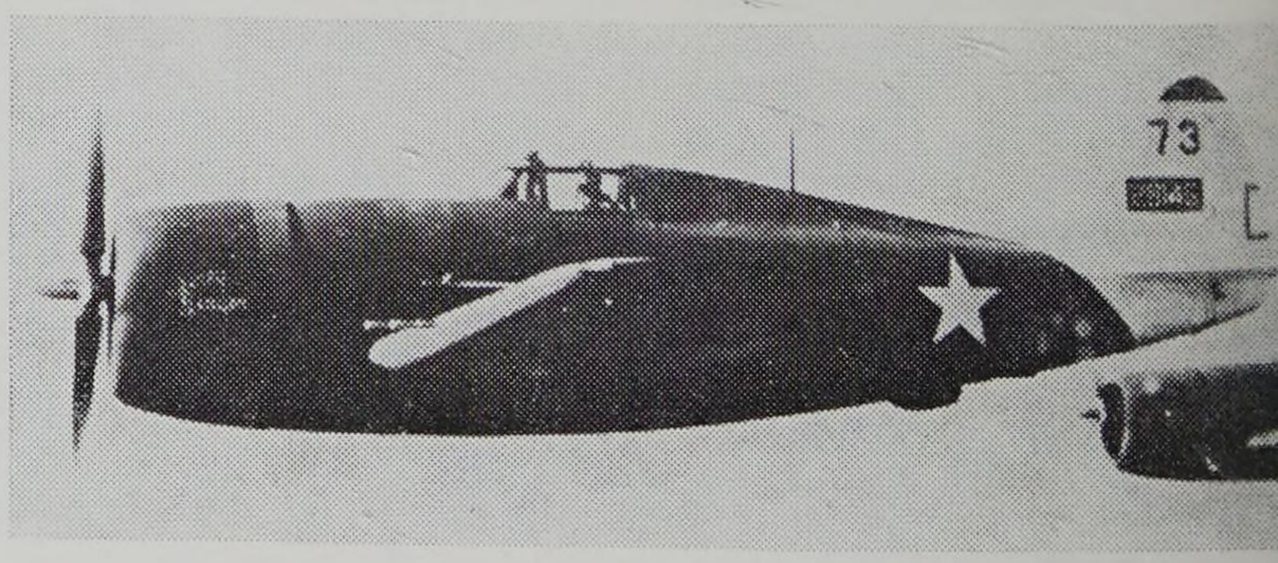
The first two P-47B Thunderbolts were rolled-out at Farmingdale in March 1942 and a flow of 50 a month was expected by mid-summer. Initially, Republic's and the Army test pilots would fly these aircraft to see that their flight behaviour was as planned and matched the favourable experience of the XP-47B. But large-scale testing and assessment of operational problems could only be achieved quickly by putting the aircraft into the hands of a fully-fledged service unit. The 56th Group was already on Republic's doorstep and this was the first unit selected to fly the mighty Thunderbolt.

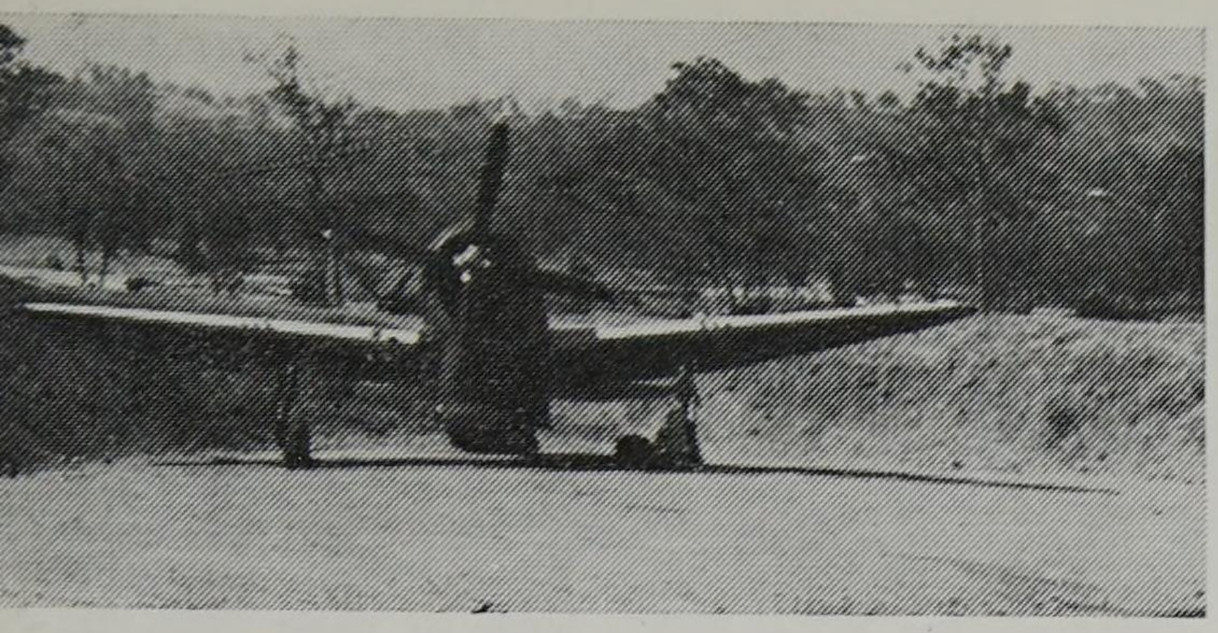
The P-47B, although incorporating many internal refinements in the light of experience with the XP-47B prototype, was outwardly identical, apart from a sliding cockpit hood and repositioned aerial mast. The hinged hood on XP-47B was awkward and in an emergency would hinder a hasty exit from the cockpit. Performance was much in line with Kartveli's proposal two years previously. Even so, the aircraft was some 650lb. heavier than planned and, in consequence, time to 15,000ft. took 6·7 minutes as against five. However, the top speed was nearly 30 miles per hour faster—429m.p.h. Technical difficulties delayed production getting under way until May and in that month the Army Air Force (the Air Corps became the Air Force in June 1941) only had four examples on hand. These P-47Bs provided the ground crews of the 56th with their first look at the engineering and maintenance problems of the Thunderbolt. The radial engine was easily accessible by the removal of quick-release cowling sections, and offered far fewer maintenance tasks than the liquid-cooled Allisons that had been the ground crews' preoccupation with the P-39. The most complex area of the whole aircraft was the mass of hydraulic lines and electrical cables linking various components with the many controls and instrumentation in the cockpit. Indeed, it was this array of levers and dials that confronted anyone climbing into the cockpit that tended to unnerve the novice pilot. The position was not quite as bad as it looked when it actually came to flying the aircraft, for most of the instrumentation and switches were connected with refinements that gave the pilot precise control over many factors influencing the performance of the fighter. There was nothing 'utility' about the P-47—its designers had gone all the way in providing the best they could to ensure a first-class flying and fighting vehicle.

By July 1942, sufficient Thunderbolts were avail-

Aces' Aircraft. Personal Thunderbolts of Gerald Johnson, 61st Fighter Squadron, and Walker Mahurin, 63rd Fighter Squadron. White nose and tail bands were type identification markings, aimed at avoiding confusion with the radial engined F.W.190. U.K. based P-47s also had enlarged national insignia under both wings. Both were presentation machines 'bought' with savings bonds, Johnson's by Jackson County, Michigan, and Mahurin's by Atlantic City, N.J. (Photos: U.S.A.A.F.)

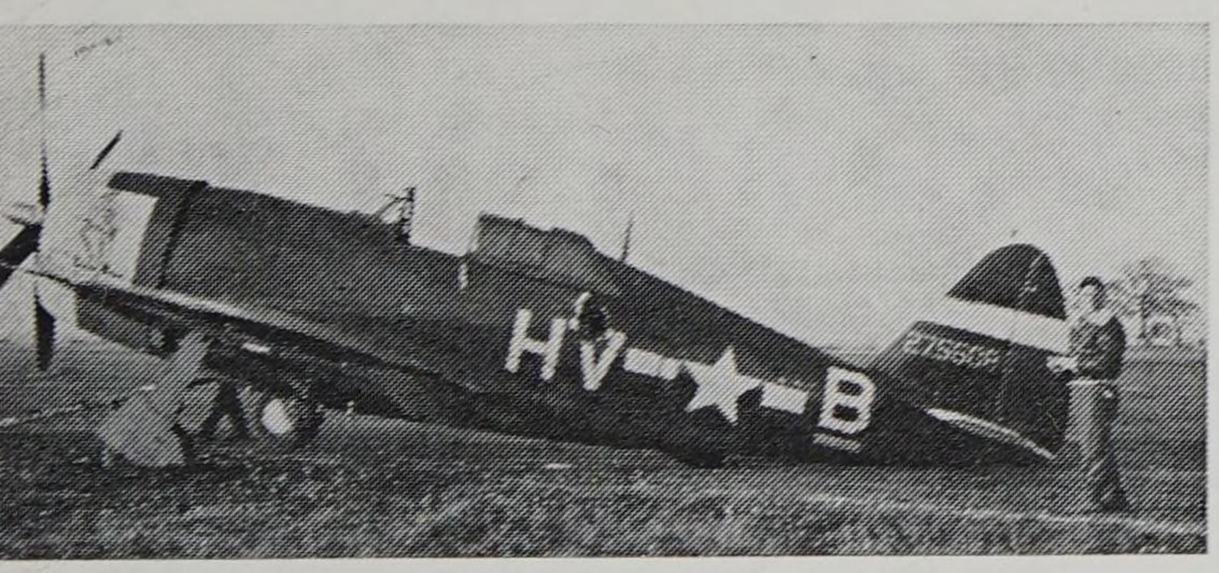
'Firey Finger', a 348th Fighter Group P-47D-2-RE sometimes flown by Colonel Kearby. White wing and tail markings were for type identification. (Photo: U.S.A.A.F.)





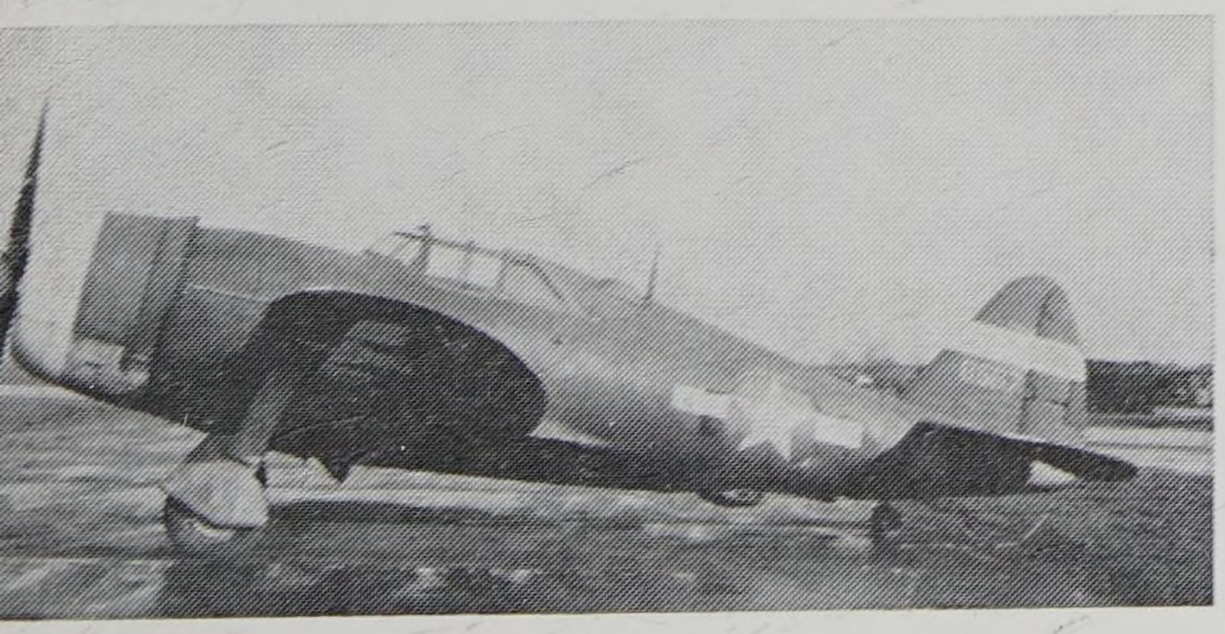
Thunderbolt of 348th Fighter Group in revetments at Ward Airfield, Port Moresby, New Guinea, September 1943. Note 200 gal. drop tank and white leading edges of wings. (Photo: U.S.A.F.)

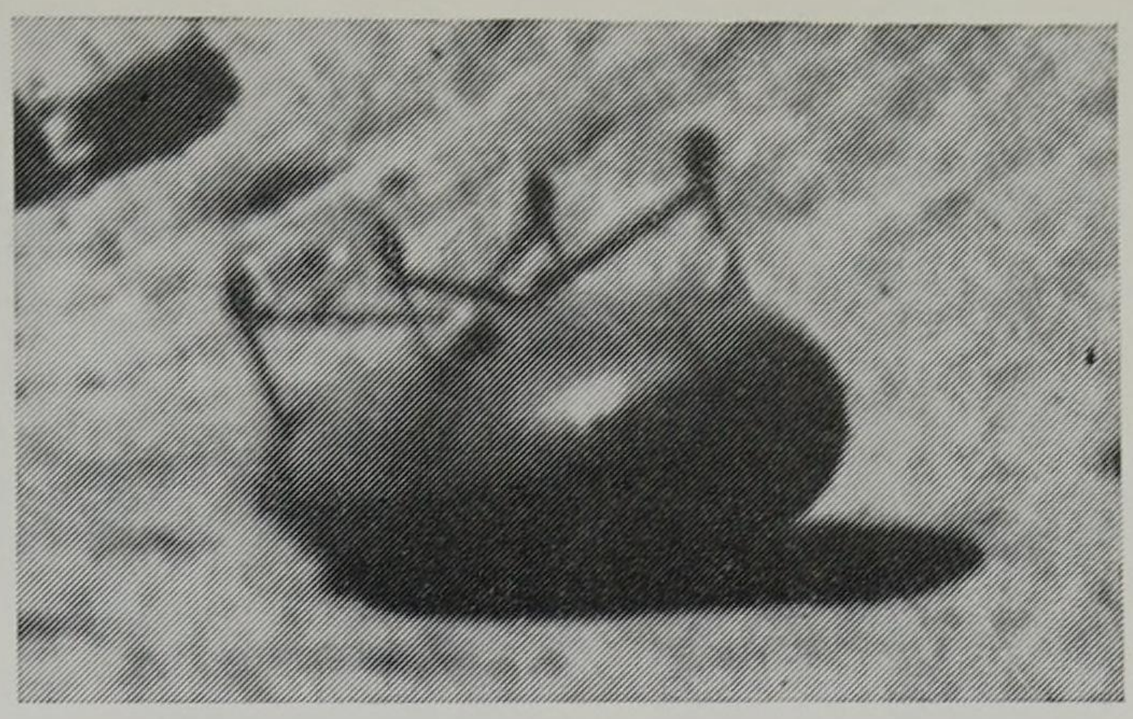
able for flight training to begin in earnest. Because it grossed some six short tons the P-47B required a take-off run of nearly half-a-mile to become airborne over a 50-ft. high obstacle. To give newcomers an ample safety margin most first flights were from Bradley Field, at Windsor Locks, Connecticut, where the runway was over a mile in length. Bridgeport Municipal Airport, where the headquarters and two squadrons of the 56th were housed, was not so generously endowed and once a take-off run was well under way a pilot was totally committed to getting the Thunderbolt airborne. Failure meant a crash into hilly terrain. The teething troubles which showed up during these early and, of necessity, cautious flights were chiefly with hydraulic and electrical items—flaws in production that were not too difficult to solve. But so much was new about the Thunderbolt—aero-engine, propeller, and numerous minor components—that some malfunctions were almost inevitable. In the circumstances there were remarkably few, and not until the young and venturesome pilots in the Group began to realise some of the potential of their



'Pistol Packin' Mama', a P-47D-11-RE of 61st Fighter Squadron came home to Halesworth after an anti-aircraft shell had passed right through the fuselage without exploding. (Photo: U.S.A.A.F.)

In the summer older P-47s were assigned to bomber groups in Europe for use in marshalling formations. 42-8567 was previously used by 356th Fighter Group and was one of a small batch ferried across the North Atlantic by air. Bump forward of the aerial originally housed a D/F aerial. (Photo: M. Davidson)





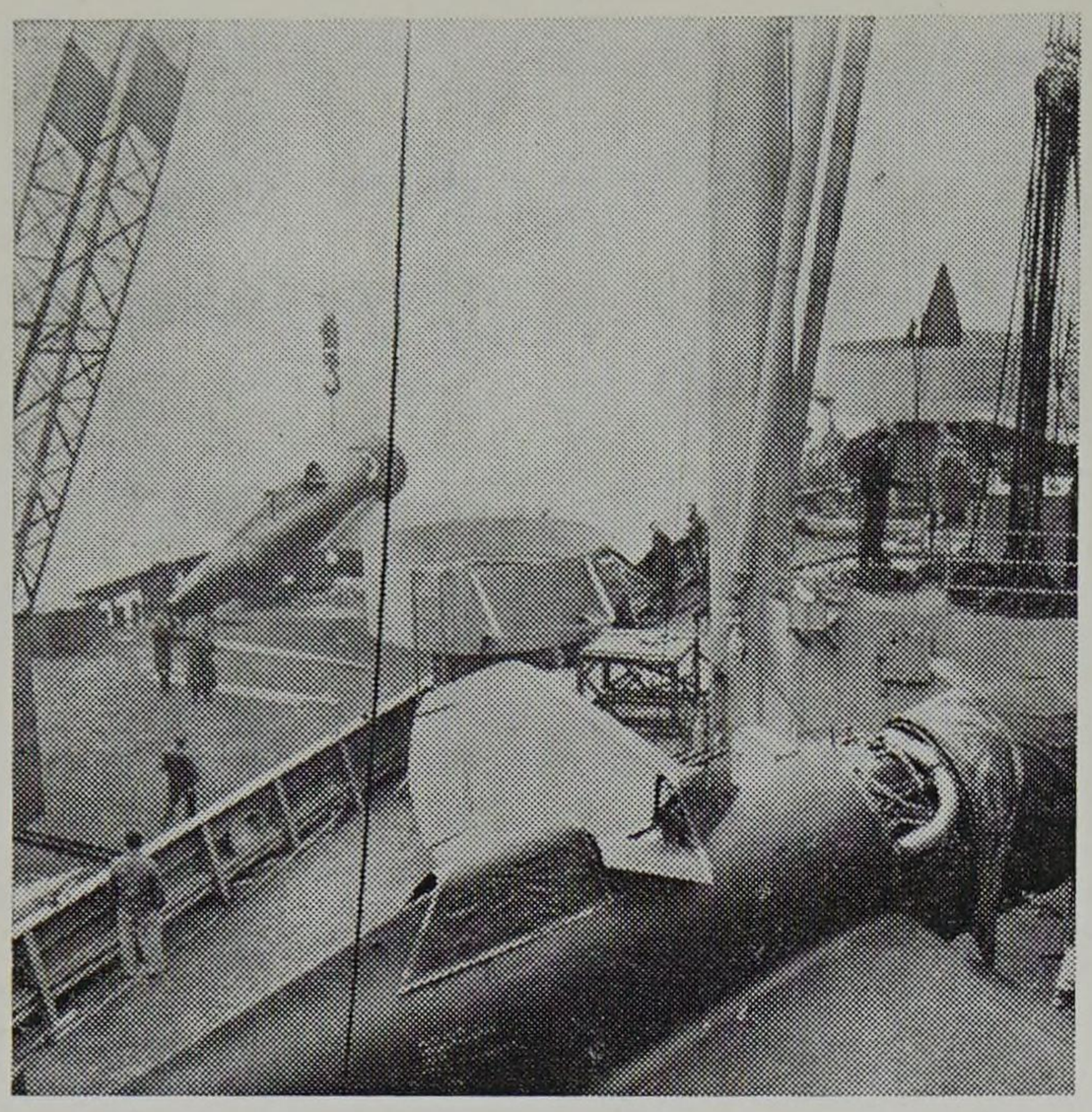
200 U.S. gallon capacity fuel tank with four point suspension constructed by Fifth Air Force engineers. (Photo: U.S.A.F.)

charges did the picture change. The reactions of pilots during transition to the P-47 followed a pattern. At first, the sheer size and apparent sophistication of the aircraft instilled extreme caution. With the confidence of increasing familiarity came the desire to discover just how fast and furiously the aircraft would travel through the upper air. For it was at altitudes above 20,000ft. that the Thunderbolt really began to impress. Whereas a pilot was conscious that he was in charge of a big aeroplane in the denser atmosphere, at five miles above the earth the P-47 was quite different. It was more nimble and given to pushing the pointer of the air speed indicator towards the 400-m.p.h. mark at the slightest provocation.

In a dive especially, the speed of the P-47B built-up alarmingly and it was not long before a pilot in his P-47—last heard from at 30,000 ft.—was discovered, at the bottom of a deep crater in a farmer's field. Similar fatalities followed and it was evident that at high speeds loss of control was occurring. Evidence followed in the form of a mangled rudder ripped from a P-47B in flight. Torn, buckled and distorted rudders on other Thunderbolts that had been flown at very high speed brought—on August 1, 1942—a limitation order of 300m.p.h., as well as embargoes on aerobatics and violent manoeuvres, and a proviso on the carrying of fuel in the rear tank.

With its penchant for gathering speed in a dive, the Thunderbolt had entered the realms of compressibility, about which little was known at the time. At 500m.p.h. the air began to act like a steel vice, exerting tremendous pressures on the fabric-covered control surfaces, and often with disastrous results. By early September, Republic had designed and tested a metal-covered rudder and this, with reinforcement to the fin, proved completely satisfactory. in eliminating tail 'flutter'—hardly an appropriate description as the fabric-covered assembly was subjected to tremendous vibrations in these dives. This was by no means the end of these troubles.

The first service examples of the new-model P-47Cs were accepted in September 1942. Even though they incorporated strengthened tail surfaces, a new engine mounting and aerial mast—all of which had proved to be unsatisfactory on the P-47B—the P-47Cs created incidents. For example, beyond 500m.p.h., recovery from power dives was extremely hazardous as elevators would not respond because of compressibility forces; in fact, controls tended to be reversed. Use of the elevator trim was the only saving device in such a situation plus the application of power to pull the nose up. To overcome these difficulties bob weights were installed in the elevator control system with the P-47C-1 models that began to appear in late October. Even so, this did not fully overcome the



Thunderbolts being hoisted from the deck of a merchantman in Liverpool Docks, February 1944. In the exposed engine accessories section can be seen the oil tank and the pipes conducting supercharged air to the carburetor. P-47D-20-RE, 42-76408 in foreground was eventually assigned to 371st Fighter Group and lost on operations in France on 10th August 1944.

problem and restrictions had to remain until the elevator control system was satisfactorily reworked.

Ultimately, when restrictions were lifted it was still deemed necessary to post a conspicuous notice in the cockpit of Thunderbolts outlining safe diving speeds. This notice stated that diving speed should not exceed 250m.p.h. above 30,000ft. and, that speeds could be raised progressively, as altitude was reduced, to a maximum of 500m.p.h. at 10,000ft. These were safe speed limits but as more was learned about the Thunderbolt's behaviour, so the experienced Air Force pilots advanced possible performance still further. On Friday, November 13, 1942, Lieutenants Harold Comstock and Roger Dyar of the 63rd Fighter Squadron had been ordered to make horizontal speed run tests in P-47Cs. The first run was at 35,000ft. After completing this test at over 400m.p.h. they dived in order to make another run at a lower level. In a matter of seconds both were in the compressibility 'vice' and the pilots were amazed to see that at one point their air speed indicators were registering the equivalent of 725m.p.h.—beyond the speed of sound! Luck was with them as the badly buffetted Thunderbolts were brought out of their earthwards plunge to deposit two incredulous and rather shaken pilots safely back at their base. In reality, however, the true speed was probably in the 500m.p.h. region because the P-47 could not attain such a pace—as 725m.p.h.—its terminal velocity being round about 600m.p.h.

Wright Field engineers ran an extensive evaluation of the P-47C-1-RE and, among their conclusions, they stated the P-47 had the best rate of aileron roll found in any type of U.S. fighter. Latches for linking the throttle, r.p.m. and turbo-supercharger cockpit controls so that correlated operation could be obtained by moving them as a single lever were a feature of this model. Intended to simplify pilot operation during cruise flight, the Wright Field test team found that it 'gave no trouble.' On the demerit side, one of their chief criticisms related to the restricted view over the aircraft's nose which would make deflection shooting extremely difficult.

The P-47C-2 model was the first Thunderbolt considered to be truly combat-worthy. It embodied production modifications deemed satisfactory to overcome the control problems, and also incorporated shackles and a release mechanism for attaching a bomb or external fuel tank to the underside of the aircraft's 'belly.' Service testing of the Thunderbolt had cost the lives of 13 pilots and a total of 41 aircraft wrecked. From many of these incidents pilots had emerged very little hurt. The extremely sound construction of the Thunderbolt which withstood the atmospheric loads experienced at 600m.p.h., also protected the pilot in all but a nose first crash. Men who had 'bellied' the P-47 in when power failed found

New natural metal finish P-47D-22-REs with 'paddle-blade' Hamilton propellers at Burtonwood depot, England, April 1944. Camouflaged aircraft have been returned from operational units for major overhaul.

P-47D-20-REs of 389th Fighter Squadron lined-up on a runway at Thruxton, England. Prior to take-off for an escort mission April 1944 (Photo: U.S.A.A.F.)

366FG

that the aircraft did not disintegrate around them with the impact and was often little damaged. The ducts that ran along the bottom of the fuselage between engine and turbo-supercharger acted as a buffer, protecting the pilots feet and legs. Experienced pilots, conditioned to the hazards of engine failure on take-off and the likely termination of an Air Force career, were soon appreciative of the fact that the Thunderbolt afforded the pilot more protection in such an incident than any other fighter they had encountered.

The P-47 had been conceived and born as a high-altitude interceptor fighter, primarily to meet a defensive requirement, the destruction of hostile bomber aircraft. By the fall of 1942 the prospect of any aerial assault against the United States was remote and military planning now centred on offensive measures. The interceptor fighter would be needed to defend any American land forces sent to battle but at this time another requirement could be met. The Allies had agreed to 'beat Germany first' and as a prelude to an invasion of occupied Europe and the enemies' homeland, a campaign of strategic bombardment from the air was to be pressed. Already U.S.A.A.F. heavy bombers had joined the Royal Air Force in strikes across the English Channel, flying in daylight whereas their British partners flew by night. Although it was thought the large formations of American bombers could protect themselves against enemy interception by means of their massed firepower, fighter support was a useful aid to this offensive. The best U.S. fighter for bomber escort and support at that time was the twin engined, long ranged Lockheed P-38 Lightning, but limited production, and the demands of other theatres of war where its presence was considered more essential, would delay its availability for units in England. The Thunderbolt was proposed as a substitute. Despite its appetite for fuel—it consumed between 90 and 130 U.S. gallons an hour at cruising speeds, dependant upon altitude—the 305 gallons of the internal tankage allowed an endurance of one-and-a-half to two hours under operational conditions. Operating from the U.K. the P-47 would have a radius of up to 200 miles, about 50 miles more than the Spitfire. Thus the decision was made to send the first combat Thunderbolts to the United Kingdom and to establish a force there for bomber support—the complete antithesis of the aircraft's original role.

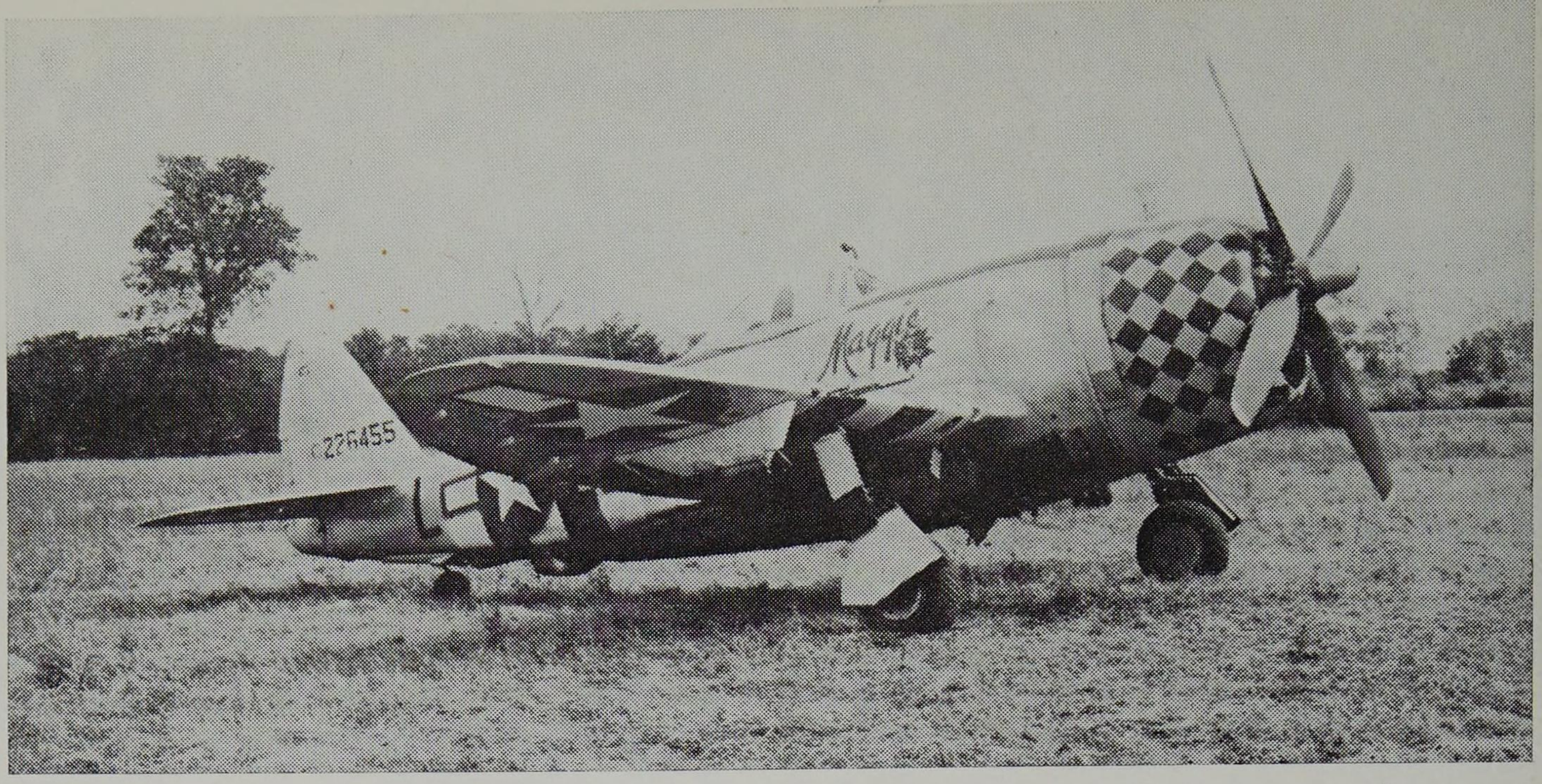
INTO THE RING WITH THE LUFTWAFFE

THE first shipment of Thunderbolts arrived at a British port a few days before Christmas 1942. A total of 88 had been deck loaded at New York and despatched to the U.S. Eighth Air Force, U.S.A.A.F.'s operating agency in the United Kingdom. Further shipments would follow at regular intervals and it was planned to have enough on hand to have three fighter groups of three squadrons each operational by the spring. One of the groups was the 4th Fighter Group which had been formed from the R.A.F.'s Eagle Squadrons (the units composed of American volunteer pilots) and was to convert from Spitfires, second was the 78th Fighter Group which had come to England with P-38 Lightnings but had all its aircraft and the majority of pilots sent down to Africa as replacements, and last the 56th Fighter Group whose personnel would arrived in England in mid January. The 4th had experience of operations, and the 56th of the aircraft; the 78th neither. But the ingredients for an effective organisation were there, and it was to be moulded along the lines of the R.A.F.'s fighter force. Indeed, U.S.A.A.F.'s fighter control, communication and tactics systems were initially modelled on those of the R.A.F.

Thus presented with this new untried fighter, VIII Fighter Command had to instigate a programme of test flying to obtain performance data and evaluate the aircraft from an operational standpoint, as at that time no such data was available from sources in the United States. The task was put in the hands of Colonel Cass Hough, a test pilot and engineer for the Command, who spent two weeks flying a P-47C from Bovingdon airfield at every opportunity. At the end of this period Colonel Hough had amassed a substantial number of facts on the aircraft's speeds, endurance at various powers, rates of climb and other factors which it was vital to analyse before committing the P-47 to battle. Hough had previously tested the P-38 Lightning in England and he held this aircraft in high esteem. Even so he brought an unprejudiced mind to work with the Thunderbolt and found that the more he flew it the more he liked it.

Despite the posted speed limitations for P-47s in dives, within a few weeks of the type's arrival in the United Kingdom there was one fatal and one near fatal dive involving Eighth Air Force pilots. To learn more about the Thunderbolt's behaviour when caught in compressibility, Cass Hough undertook a series of test dives at the end of February 1943 and during one undoubtedly reached the aircraft's terminal velocity.

On the other side of the English Channel two elite Luftwaffe fighter organisations composed of fifteen or so Stafeln (squadrons) would be ready to give the new fighter a hard time with their Messerschmitt Bf 109s



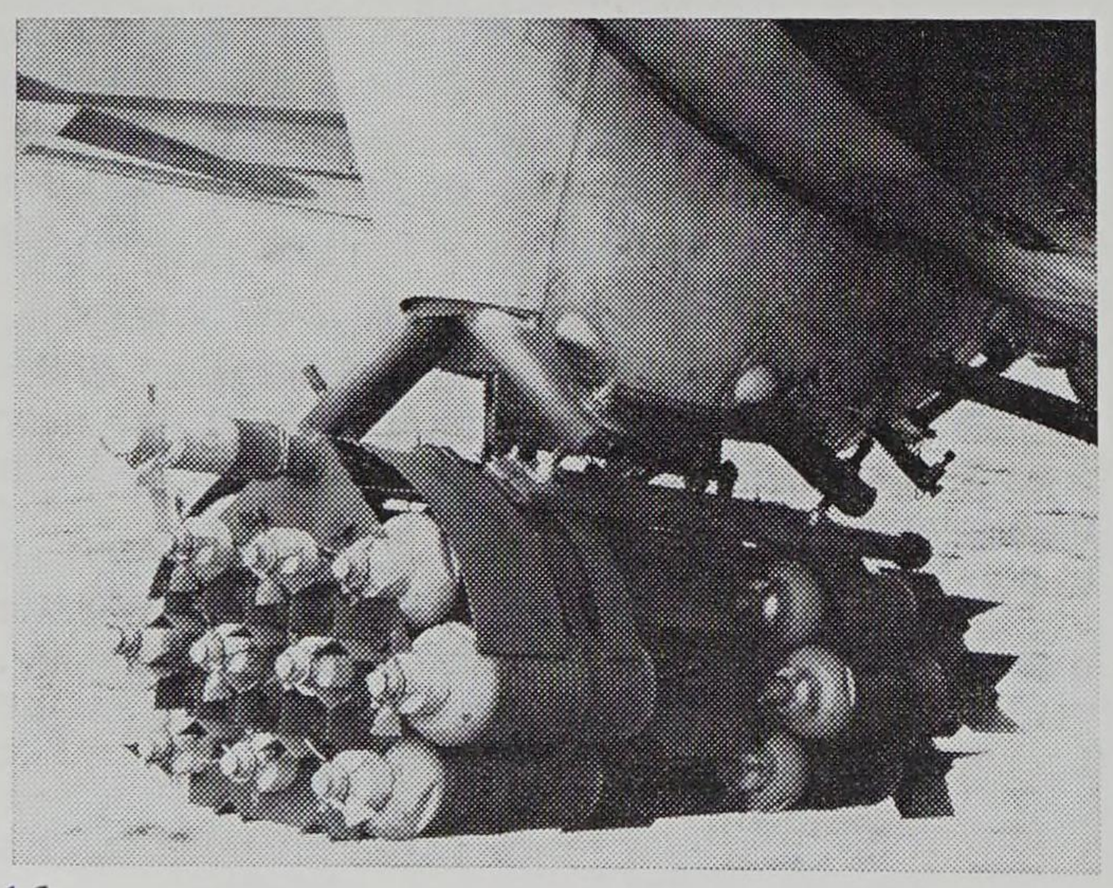
The bubble canopy transformed cockpit visibility from the 'restricted' to the 'excellent' status. 'Maggie V' was one of the first examples of a P-47D-25-RE to reach the 350th Fighter Squadron at Raydon, England. (Photo: U.S.A.A.F.) 353 FG

and Focke-Wulf FW 190s. It was therefore only prudent that the P-47C should be put through its paces with specimens of these German fighters captured and flown by the R.A.F. In trials with an FW 190 A the Thunderbolt proved the faster in horizontal flight at altitudes over 15,000ft. Its acceleration was not up to that of the Focke-Wulf but in a chase it could eventually overhaul the German and then pull away from it. Lack of initial acceleration was particularly marked in a climb from horizontal flight and even in a dive the Focke-Wulf pulled away rapidly, although here it did not take long for the Thunderbolt to close. At high altitude the P-47 could out-turn the enemy aircraft but below 15,000ft. it was very much at a disadvantage unless the speed could be kept above the 250m.p.h. mark. It was noticeable, too, that the Thunderbolt lost speed in a turn. In the upper air the U.S. fighter undoubtedly had a superior performance and its zoom climb was fantastic. Zoom climb was the term for a climb added by the momentum of a preceding dive. Obviously in the first instance, P-47 operations should be restricted to heights above 15,000ft. and on this basis the initial employment of the combat P-47 squadrons was worked out.

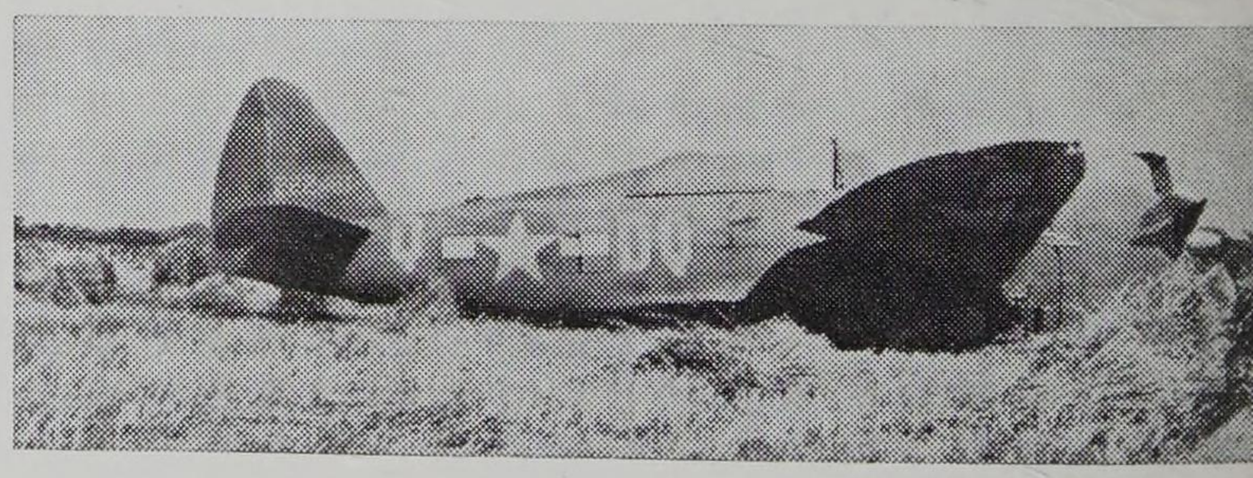
The first P-47Cs were sent to the VIII Fighter Command's training station at Atcham, just outside Shrewsbury. Here pilots went through a conversion course but to expedite matters training was also conducted at Debden (Essex), Goxhill (Lincolnshire) and Kings Cliffe (Northamptonshire) the respective bases of the 4th, 78th and 56th fighter groups. At Debden the arrival of the Thunderbolt was not popular, chiefly due to the contrast between the Republic giant and the Spitfire to which pilots were accustomed. The transition was not an easy one, most pilots finding the P-47 sluggish and unmanoeuvrable, as indeed it would appear after experience in the cockpit of a machine weighing about a third as much. At Goxhill most of the pilots were fresh from training on the aircraft in the United States and only the few deprived P-38 men were critical. Kings Cliffe units, however, had a certain jubilation on being reunited with the beast they had come to tame.

The Thunderbolt, alas, did not at first take kindly to its new environment, and high in the wintry English sky time and again engines would cough and splutter and sometimes cut out completely. The air at 25,000ft. over north-west Europe usually has a far higher humidity than that of the New England area. In this instance it asserted its presence by creeping into the ignition systems, making it necessary to seal spark plug leads with special damp-proof compound and, at the same time, to lag the push rod covers on engine

Detail of wing pylon shackles and fragmentation bomb cluster. Release vane (forward of front sway-braces) operated after cluster was released and scattered lethal bombs. (Photo: U.S.A.F.)



Crash landing: This P-47D-2-RA of the 495th Fighter Training Group made a fairly comfortable 'wheels-up' in an English wheatfield, August 1944.



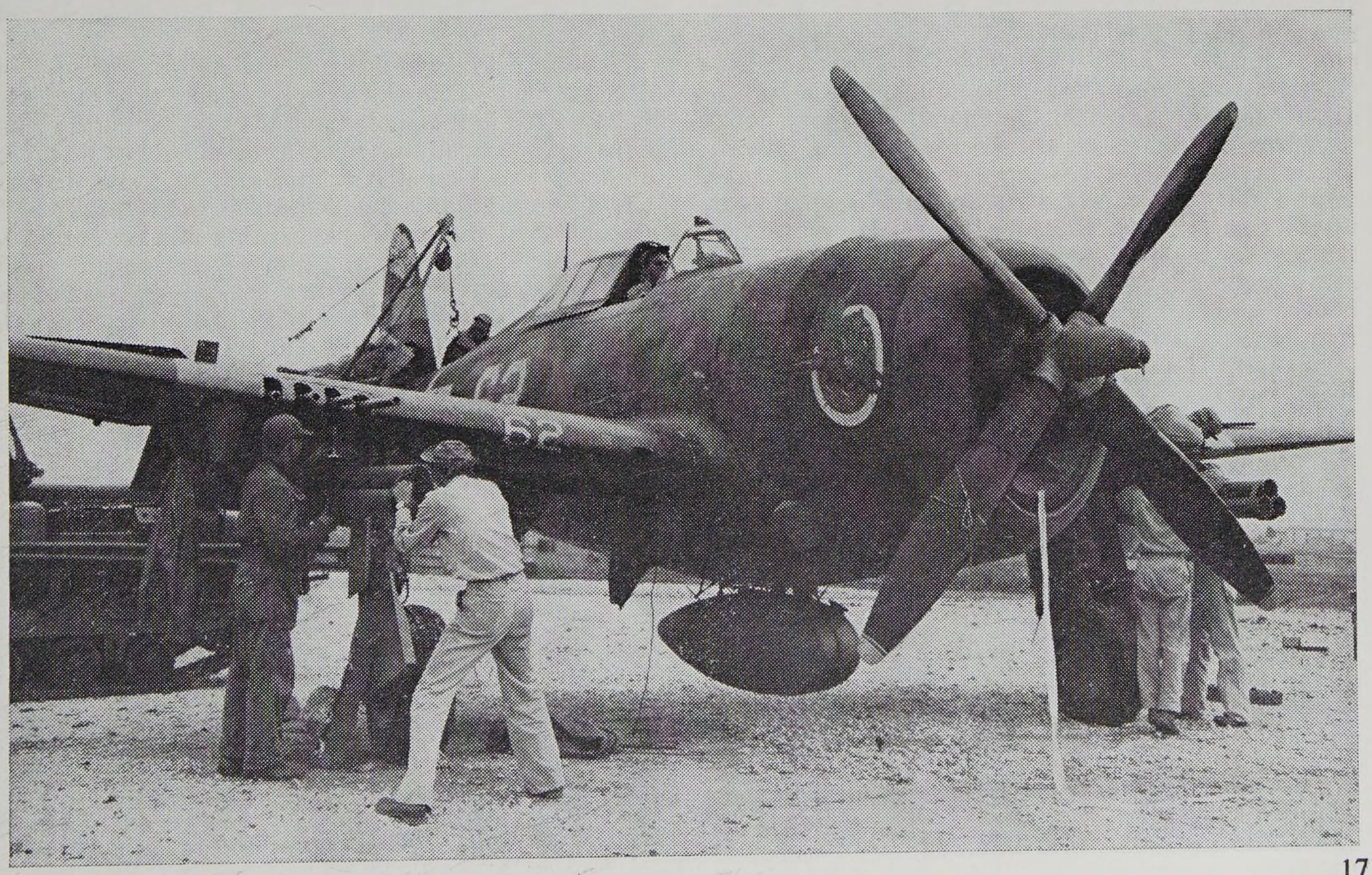
Crash landing: a brick wall, telephone pole, two fir trees and a bank made a complete wreck of 62nd Fighter Squadron's 42-28812 in October 1944. The pilot, however, survived. 56FG

to raise cylinder head temperatures which tended to be far too low.

A certain amount of radio modification and replacement had to be performed so that the aircraft had similar VHF facilities to R.A.F. fighters, but here a new problem arose. Strangely, radio communications with many P-47s were almost impossible due to noise, soon diagnosed as interference from the engine's powerful ignition. A first operational sweep by the 4th Fighter Group with 14 P-47s on March 10, 1943 was plagued by this interference and no further operations were carried out until the trouble was solved. Static electricity from corrosion of magneto seals was the principal cause and bonding insulation of magneto distributor caps was the solution, albeit temporary, as the trouble was not completely eliminated until much later with the pressurisation of magnetos.

On April 8 operations were commenced in earnest with a sweep by 24 aircraft over the Pas de Calais. This and following operations by the three groups over the next few weeks were chiefly fighter sweeps conducted at around 30,000ft. and of limited penetration over enemy territory. The first known brush with Luftwaffe interceptors came on April 15 and resulted in a brief skirmish between the 4th Group and some FW 190s. Major Don Blakeslee dived on a flight of three and was able to shoot one down on the outskirts of Ostend to claim the first victory for the Thunderbolt. Three P-47s failed to return, one shot down in the engagement and the other two almost certainly lost due to engine failure. Two of the pilots were killed, Captains Richard D. McMinn and Stanley M. Anderson, first men to fall in battle with the Thunderbolt. This opening bout did nothing to endear the P-47 to the 4th Group, particularly as the supposedly reliable radials had failed to maintain their reputation. The next few weeks saw several Thunderbolts failing to return from operations due to engine trouble but the VIII Fighter Command investigating team soon realised that there were many common factors, chiefly blown cylinder heads and that the failures nearly always occurred after combat when full power had been used. The sophistication of the aircraft's engine control system allowed precise adjustment for all flying requirements but also enabled the unwary to make settings that fed extreme pressures into the engine so that detonation (an explosion in the cylinder at the wrong point) could occur and damage cylinder head or piston. Power into the engine was measured as manifold pressure and it was essential that the pressure setting went hand in hand with the correct engine revolutions. Failure to do this would raise cylinder head temperatures to a point where detonation was bound to occur. The inter-relation of turbo-

Aligning rocket launching tubes on a 65th Fighter Squadron Thunderbolt at Grosseto, Italy. Drop tank is 75 gal. metal type. Note muff to keep dirt from entering nose air intake. (Photo: U.S.A.F.) 57FG



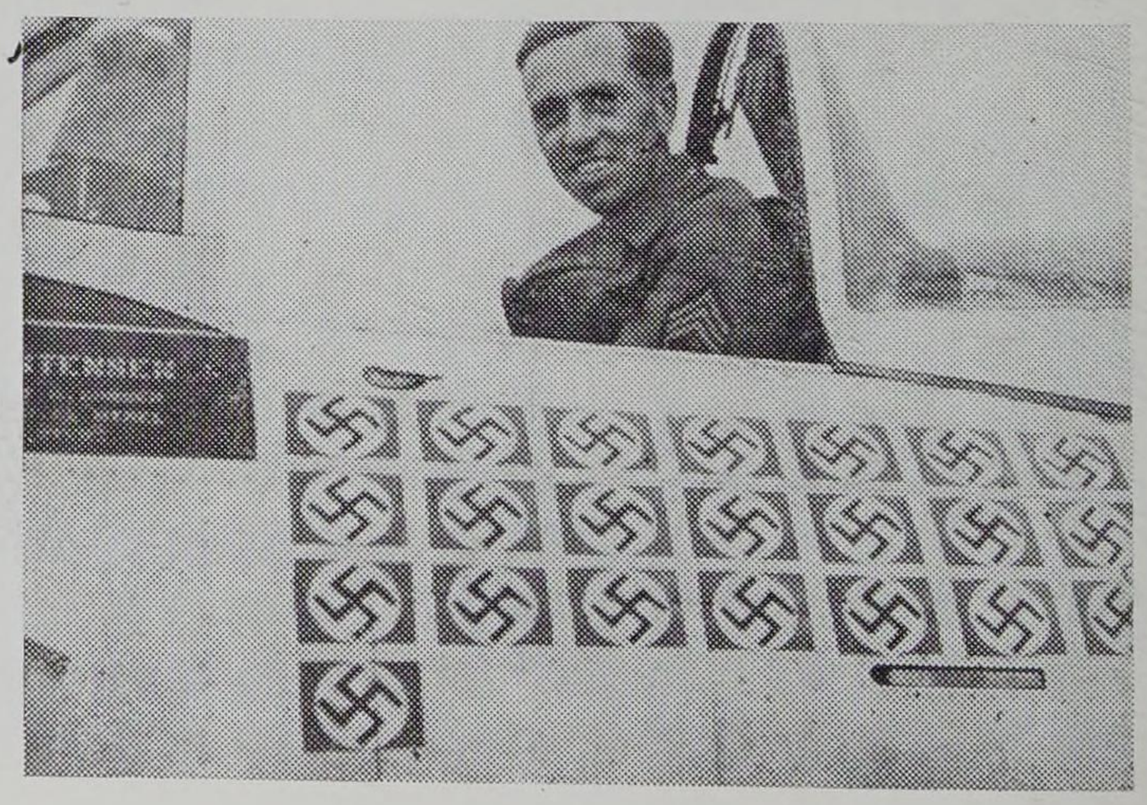
supercharger, throttle and r.p.m. was vital and when a pilot's attention was concerned with attacking or escaping his enemy, it was easy to unintentionally take some action that would overstrain the engine. Furthermore, such damage was not easily detected and the actual failure might come on a subsequent flight. While pilots could be cautioned against these dangers, a system of automatic safeguards was eventually devised as an aid against high manifold boost.

Modifications were constantly introduced both at the factory and at depots in the United Kingdom. P-47C-5 models incorporating minor changes to components arrived in the United Kingdom in February 1943 and by April the first of the D series was reaching the squadrons. The P-47D-1-RE was outwardly almost identical to the C-5. Internal refinements included a redesigned exhaust gas duct for the turbo-supercharger, changes in the engine accessory compartment, and increased armour for the pilot. One of the most important advances was effected in the theatre, the development of an external fuel tank that would give greater endurance. First use of external tanks, coloquially known as drop tanks or belly tanks, came in late July 1943 when P-47s flew to the German border with Holland and surprised Luftwaffe fighters forming up to attack U.S. heavy bombers. These were

Thunderbolt score boards. Major Herschel Green, 317th Fighter Squadron, Lt. Col. Francis Gabreski (top right), and Captain Robert Johnson (bottom left) of 61st Fighter Squadron; and Sgt. Carl Conner, Crew Chief, in Captain Fred Christensen's aircraft. (Photo: U.S.A.F. and Romack)

flush-fitting, paper-composition tanks manufactured in the United States and with a capacity of 200 U.S. gallons. Changes in atmospheric pressures with altitude meant that fuel could not be drawn from them above about 20,000ft., so only partly filled they were employed to take the P-47 up to that altitude before release. VIII Fighter Command engineers under Colonel Hough designed and perfected a pressurised tank system employing the exhaust from the aircraft's vacuum pump. First used operationally in August the tanks could be retained up to normal operating heights without interruption of fuel flow. Metal tanks originally designed for P-39 Airacobras were the first modified for this purpose and the 75–80 gallons capacity allowed the Thunderbolt to venture 280 miles from base. A paper composition tank, based on those originally designed for Hawker Hurricanes, was put into production in England and this allowed penetration to about 325 miles. The drop tank was the means of making the P-47 a real, long-range escort fighter.

With growing confidence in their aircraft the pilots of the three P-47 groups were beginning to make their presence felt in the outcome of the vast air battles that raged on practically every occasion a force of Fortress bombers was despatched to strike at some distant target beyond the Channel coast. The 78th Group had seen most of the successful fighting and on June 29, 1943, Captain Charles London of that organisation shot down two enemy fighters to bring his personal score to five and be acclaimed first Thunderbolt ace. The account of this action in his squadron's daily



Rocket tube installation. Aircraft is a P-47D-27-RE of the 314th Fighter Squadron operating from Southern France. (Photo: U.S.A.A.F.) 324 FG

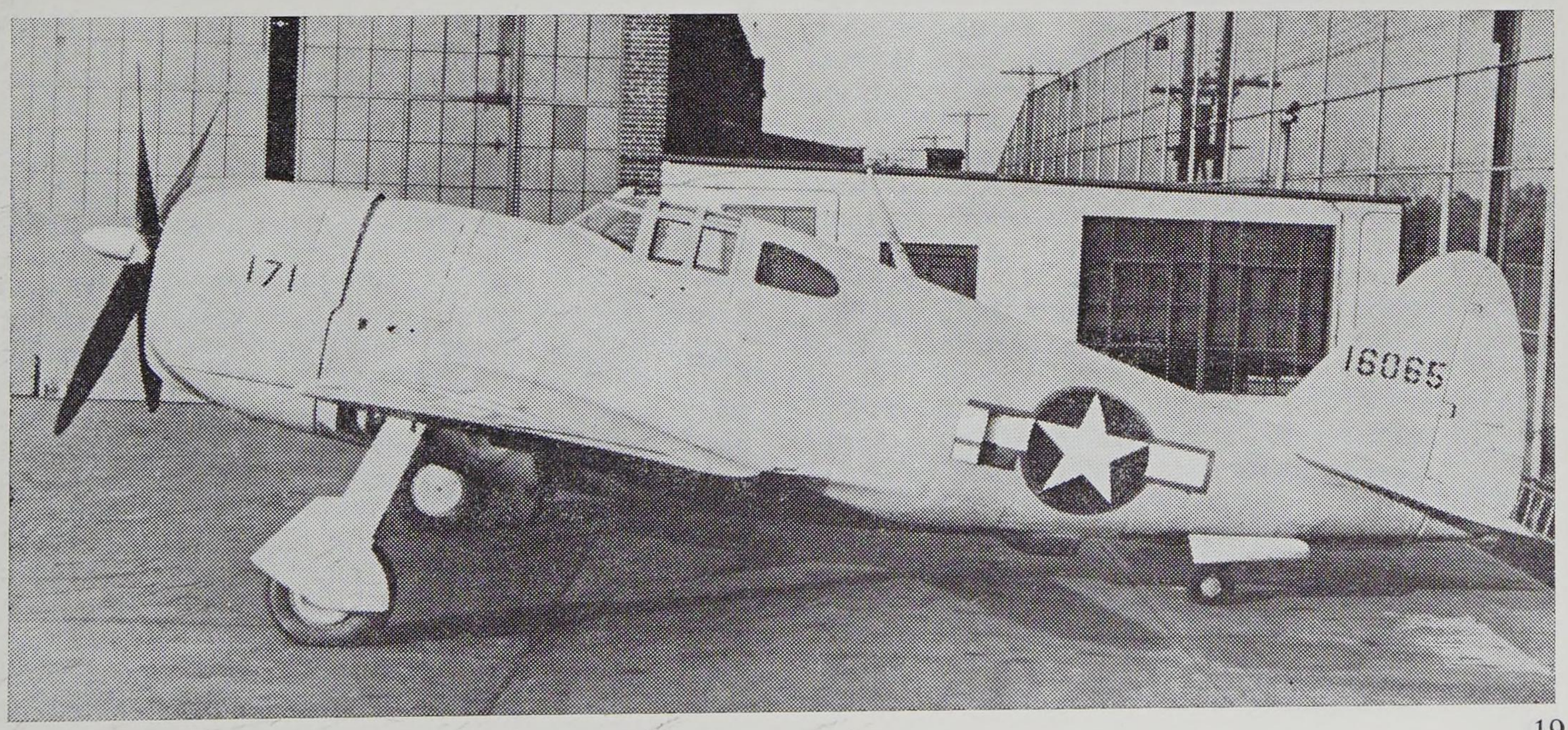
diary reads as follows: 'Three Me 109s seen positioning themselves for frontal attack on the heavy bombers. 83rd Squadron, Red Flight, led by Captain London shot at nearest, which began to smoke and one wheel came down. Enemy aircraft remained in formation so Red Leader fired again and it blew up. Red Leader, closely followed by his wing man, swept under heavy bombers and came up on tail of another Me 109, opening fire at 75 yards, and he just blew up too.'

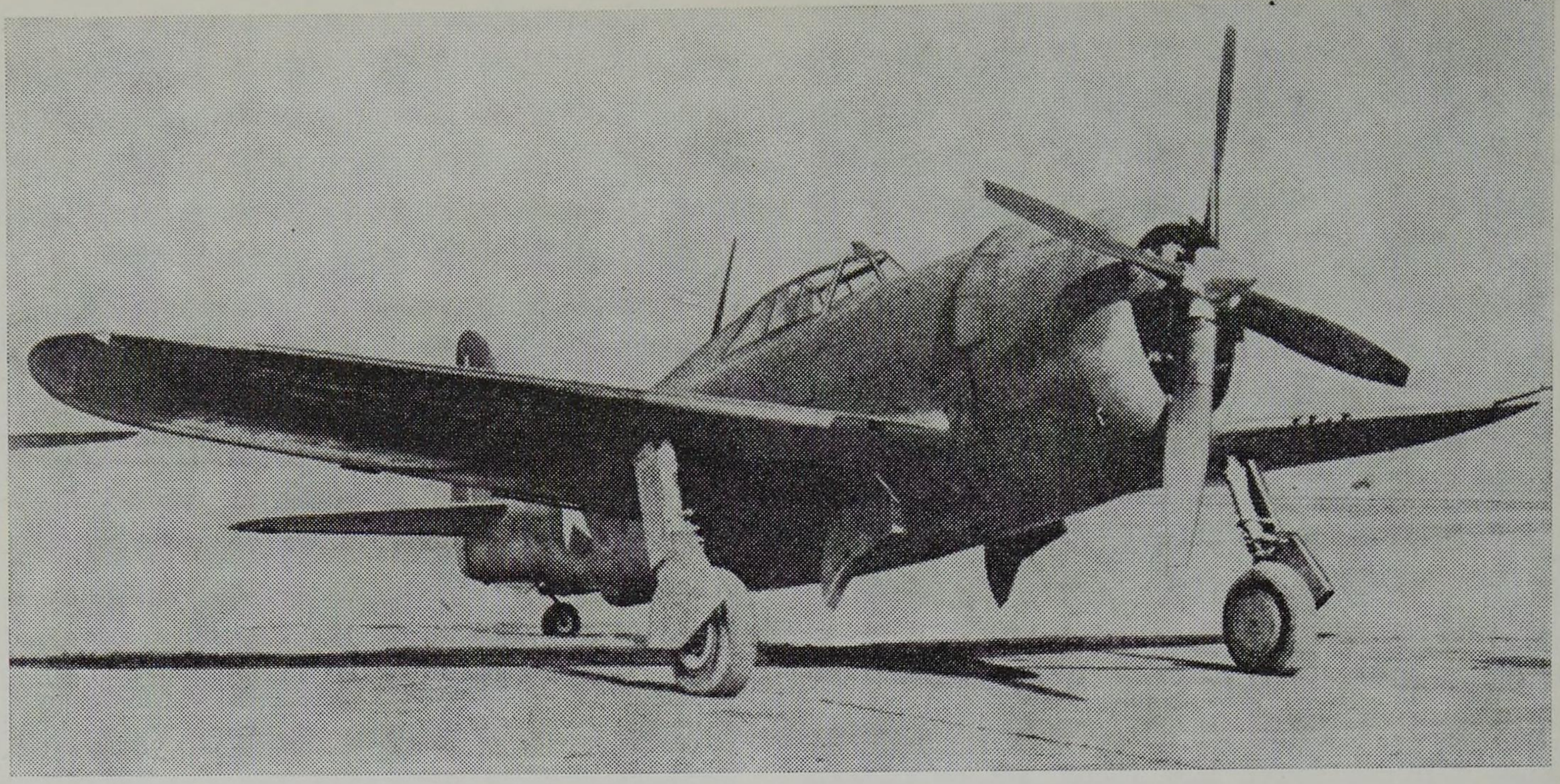
The German fighters were usually instructed to concentrate on attacking the heavy bombers during daylight raids and unless attacked to avoid contact with Allied fighters. This policy was their undoing, for with advantage in altitude the Thunderbolts could dive on the enemy as he manoeuvred to attack the bombers, and then zoom climb back to altitude. Furthermore, the Luftwaffe conditioned to evading Spitfires for three years had a stock manoeuvre when attacked of rolling over and diving, a Spitfire being soon outpaced. When this happened before a Thunderbolt interception the enemy was a 'gone goose'. An FW 190 and Me 109 might gain for the first few hundred feet of the descent but the Thunderbolt would soon be close behind and able to follow most manoeuvres the enemy chose. It took a long while for many German pilots to appreciate that one should never attempt to out-run a Thunderbolt; and many never did! The P-47 had another virtue, its enormous firepower. The fuselade of half-inch bullets loosed from a one-second burst of the eight Brownings could be reckoned to bring down the enemy if the aim was good and the range correct. On the other hand, the P-47 itself could take a great many hits, even from cannon shells and still fly on, particularly if attacked from the rear. Many bullet-riddled and cannon-blasted Thunderbolts were brought home from a combat over occupied Europe to give testimony to the robustness of the aircraft's construction. Luftwaffe pilots came to comment on this thick hide and those with victories over P-47s generally made their kills by deflection shots at the more vulnerable sectors of the aircraft.

The 56th Group, first with the P-47 was led by Colonel Herbert Zemke, not only an accomplished fighter pilot but an astute tactician with keen appreciation of the advantages and limitations of the fighter his group flew. In the early battles with the Luftwaffe the 56th had often come off on the loosing end but by August 1943 it was fast becoming a polished fighting unit that knew how to use the speed and firepower of the Thunderbolt to advantage. From August 1943 it achieved one success after another and its record of air combat was never surpassed by any other U.S. fighter group operating from England. The first of these major victories came on August 17 when it flew to meet the beleaguered Fortresses returning from the first memorable mission to Schwenfurt. The following is the course of this action as recorded by the 56th's historian:

'51 a/c from 61st, 62nd and 63rd Squadrons led by Colonel Zemke to furnish withdrawal escort for B-17s. Group took-off Halesworth 1520hrs. Landfall in between the north of Walcheren Isle and Hamstede at 1555hrs. at 20,000ft. Belly tanks released at 20,000ft. at 1605hrs., 5 miles north Antwerp. Group climbed 20–27,000ft. and penetrated about 15 miles east of Eupen. Rendezvous made with heavy bombers at 1621. A turn made to left and group positioned themselves on top of bombers—one squadron covered first box and two covered rear. Approximately 50–60 enemy aircraft seen making attacks on heavy bombers. Mostly FW 190s and Me 109s plus six Me 110s. A slight change was noted in tactics. Instead of flying parallel

Hinged canopy distinguished the pressure cabin XP-47E. (Photo: Republic)

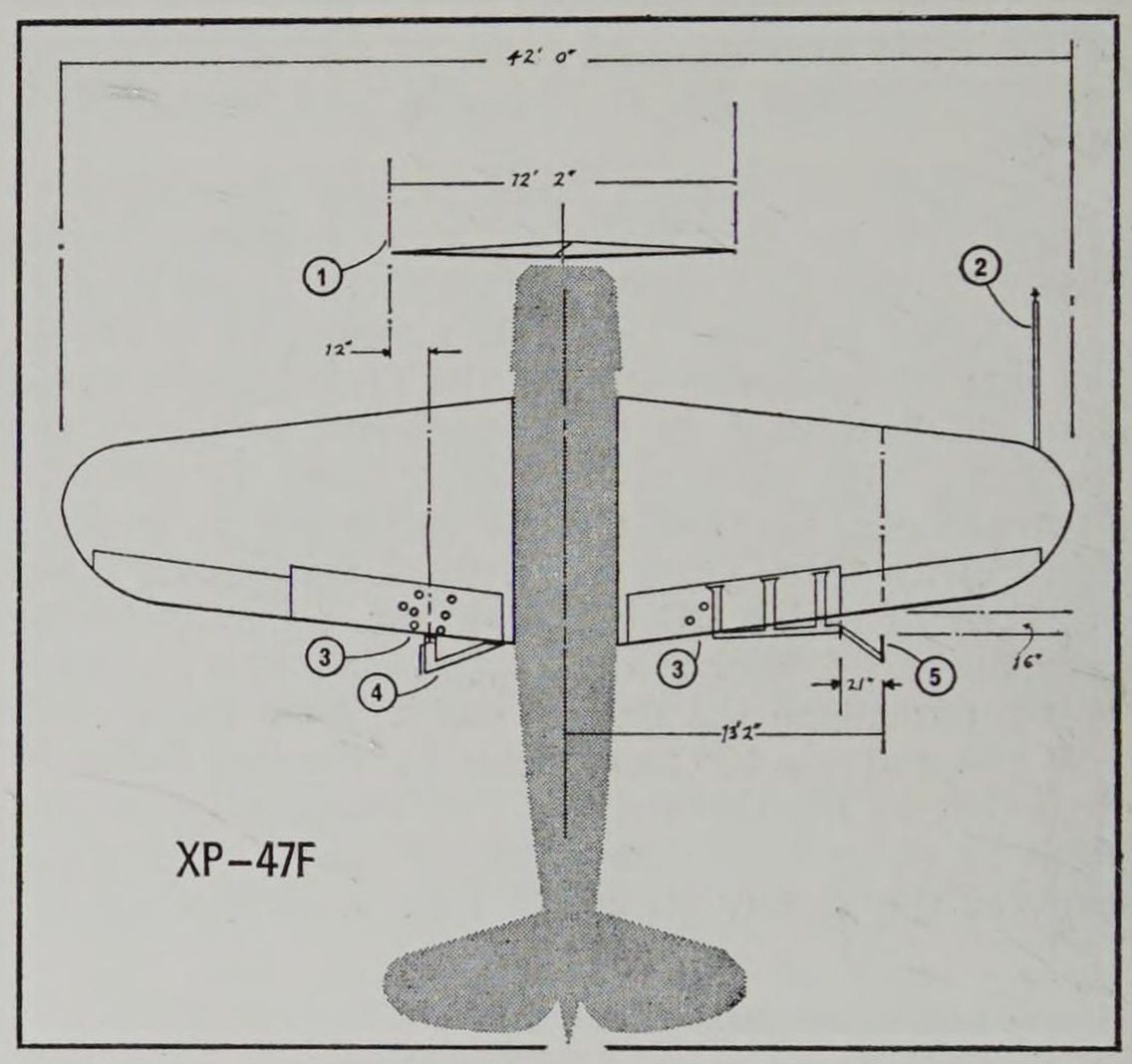




XP-47F was not a very stable aeroplane. The laminar flow wing was purely experimental. Part of the Wake-survey rake can be seen under the trailing edge of the right wing. (Photo: F.C.N.)

to heavy bombers about 3,000ft. above them and coming in for head-on attacks after a 180-degree turn, they were seen to fly at same level as bombers about five miles ahead. Attacks were instituted from this position by making a sharp 180 degree turn and then diving head-on towards the bombers. The Group was able to thwart the majority of these attacks by diving from above on the enemy as they started their dive. As a result numerous combats ensued from the vicinity of Leige to a point 20 miles north of Antwerp where the group left bombers and Spitfires took over.

Selection of Individual Combats. Captain Gerald Johnson (61st). Captain Johnson had just fixed his sight on an Me 110 and pressed the trigger when he noticed another P-47 had opened up on the same ship. Bullets from both planes played a pattern on the ship. In a fraction of a second the entire Me 110 exploded. Captain Johnson climbed up into the sun, glanced down and spotted an Me 109 heading for the bombers. He dove down on him out of the sun, closed in on his tail and opened fire from 200 yards. The first burst got him in between engine and cockpit. Strikes were observed on his wings and tail. The Me 109 then exploded in mid-air. Captain Johnson spotted another Me 109 coming in on the heavies from astern. He had the speed on him and started to close in a steep dive. He let him have a two-second burst from 100 yards astern, the Me 109 rolled over and headed for the ground. Lieutenant Comstock (63rd) spotted two Me 109s about his level but a little below. As they passed under him he did a half roll and went after them. As he was closing the last Me 109 took evasive action but the first kept right on for the Forts. He moved up to within 100 yards, missed with the first burst (one second) then after correcting his deflection let him have a two-second burst which severed his left wing from the plane. Captain Walker Mahurin (63rd) saw a FW 190 ready for a stab at the Forts. He closed to 150 yards and opened fire. The whole plane exploded with pieces flying out in a huge smoke ring. He spotted another FW 190 between himself and Lieutenant Hall (63rd). This Focke-Wulf was headed for Lieutenant Hall's tail. Captain Mahurin closed on the 190, opened fire, hitting the wing root. The FW 190 went down out of control. Lieutenant Hall (63rd)



The Laminar-flow wing applied to the XP47F.

1. Propellor rotates in clockwise movement.
2. Airspeed boom swivelling static pressure lead.
3. Small circles locate positions of 8in. airflow tufts.
4. Half-weight tailing-edge survey rake.
5. Weight-survey rake.

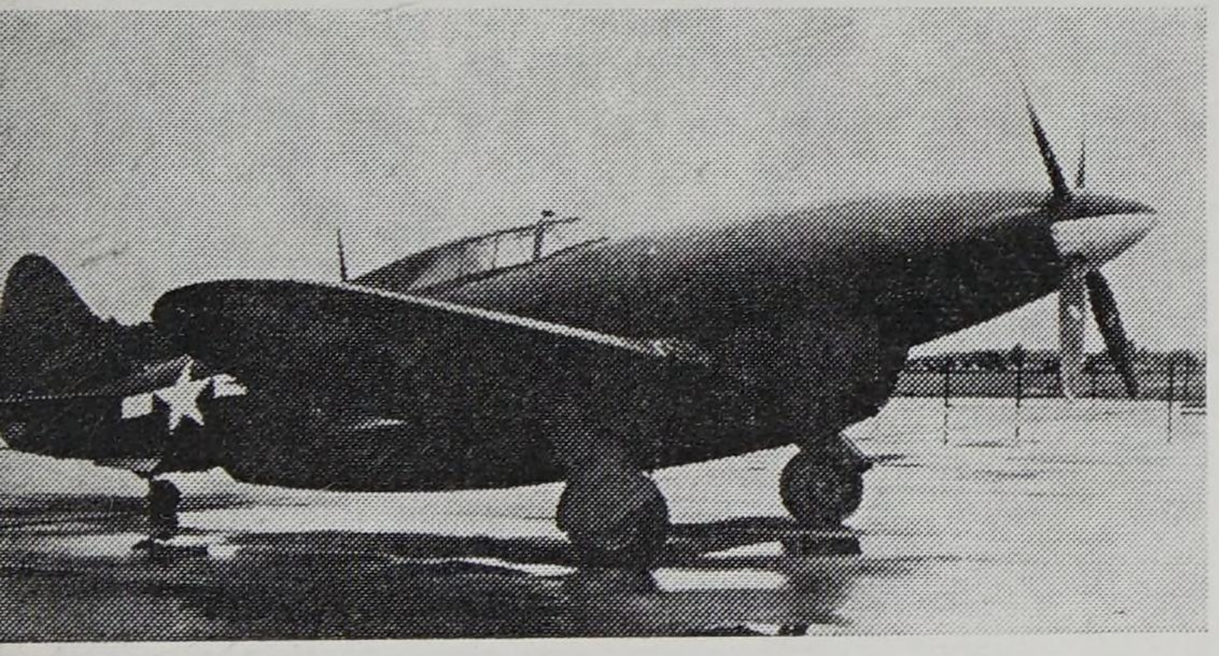
spotted an FW 190 about to make a head-on attack on the Forts. Lieutenant Hall was on the inside of a turn and had the 190 right in his sights. FW 190 flipped to right and went into spin. Lieutenant McCauley (61st) spotted three FW 190s in V-formation to the right of the bombers. He dove to attack the right wingman from directly astern. On his first burst pieces flew from both his wings and smoke came out of the right side of the engine, but he stayed in formation. Lieutenant McCauley opened up again. More pieces came off and the pilot baled out. Lieutenant Schiltz (63rd) broke away from his flight and headed down on a flight of 30 FW 190s. Two of them must have seen him and turned up to meet him head-on. Lieutenant Schiltz opened up on the leader from 200 yards and let him fly through his fire. Schiltz

pulled up to the right and started to circle. Spotting four FWs flying in a string, he closed to 400 yards on the No. 2 man and opened fire. At 200 yards he hit the engine and cockpit killing the pilot. He opened fire on the leader at 300 yards with a 4-second burst. His right wing broke off and the aircraft started down. Lieutenant Schiltz circled to find the bombers and found two FW 190s turning in on the B-17s. He was about 4 o'clock from them. This placed him on the tail of the two FW's. He opened fire on the rear Jerry from about 250 yards. The bullets started to hit on the wing root and continued forward to the engine which burst into flames. Lieutenant Schiltz is the second pilot to shoot down three enemy aircraft on a single mission in the ETO.' The Group score on this operation was 15 destroyed, three probably destroyed and four damaged. Three 56th pilots failed to return.

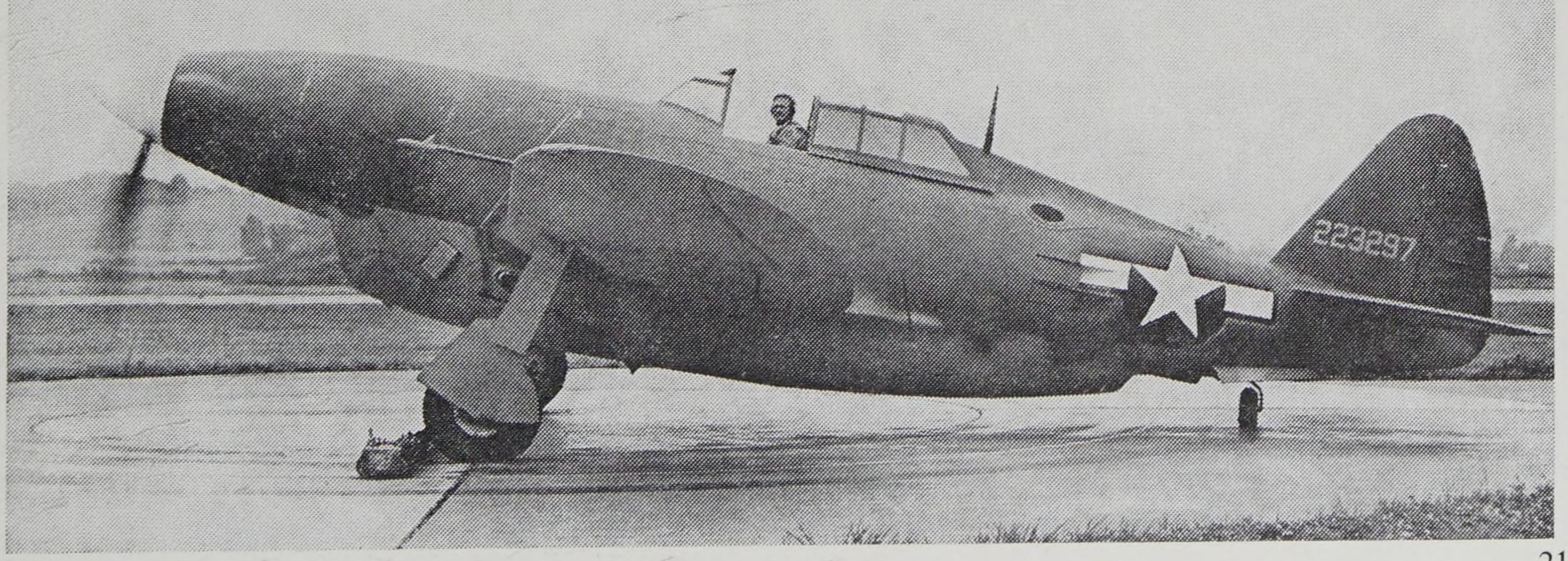
The Thunderbolt may have been the biggest, heaviest fighter in the world, but in the late summer of 1943 it was fast establishing itself as the most deadly of Allied fighters the Luftwaffe had to contend with at the threshold of the stratosphere.

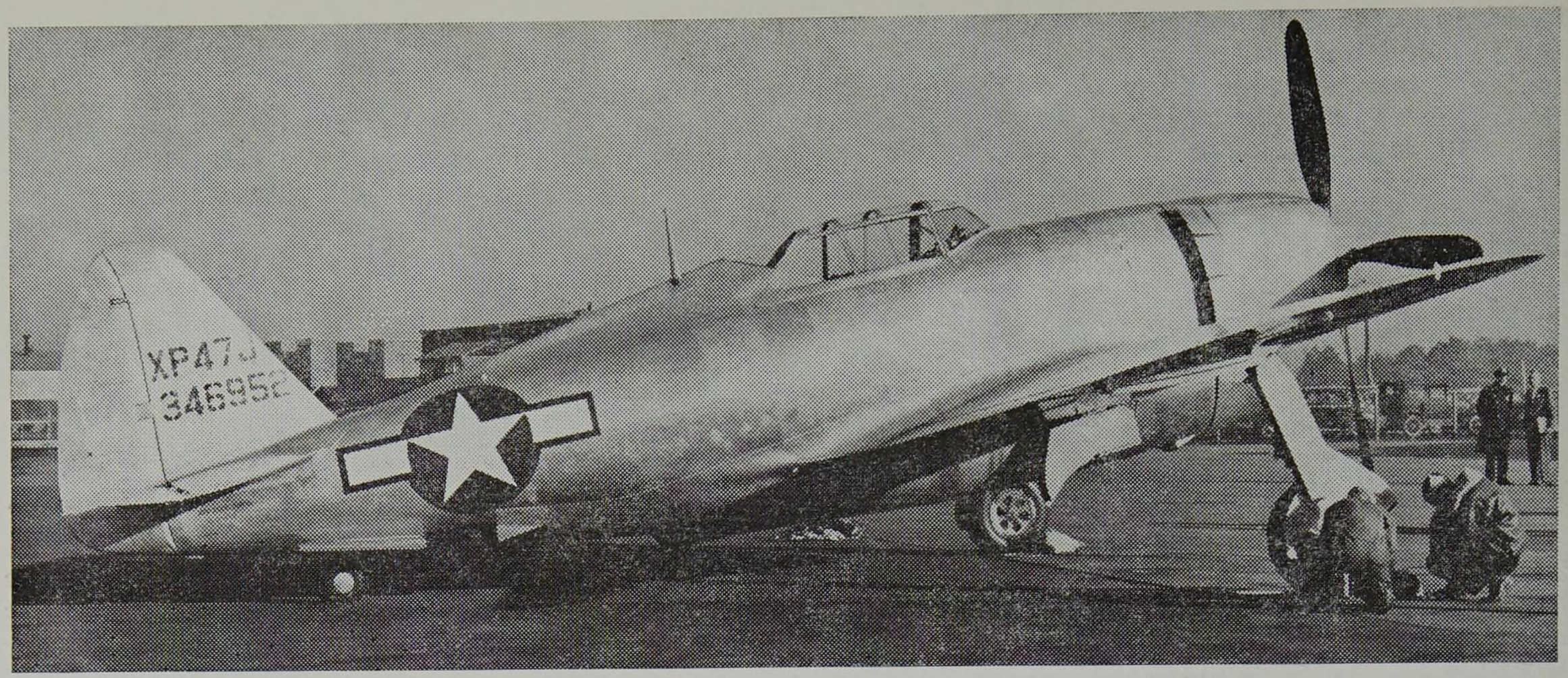
INTO THE RING WITH THE JAPANESE

THE second fighter group to commence training on the Thunderbolt was the 80th, which moved into Farmingdale early in July 1942. It inherited P-47Bs from the 56th Group and for the first few months of its existence operated very much as a source of trained pilots that could be despatched to England. Not until April 1943 was it finally sent on its way under sealed orders. The speculation as to their destination kept personnel busy during the long sea voyage via Brazil, round the Cape of Good Hope, Ceylon and eventually to India. There they found no P-47s to fly and instead of fighting at 30,000ft. the group found itself training again, this time for ground support with the P-40 Warhawks. Third in line for the Thunderbolt was the 348th Group which began forming at Bradley Field in October 1942 and also inherited P-47Bs and Cs passed on from the 56th. It trained at New England bases until the early spring of 1943 when alerted for overseas movement. Originally scheduled for the United Kingdom the 348th found itself going the other way, destination Australia. In June, 59 Thunderbolts had arrived in Australia for assembly and these were ferried to Port Moresby, New Guinea, site of the main base from which the 348th would commence operations. The Fifth Air Force, to which the group was now assigned, was a small force of a few hundred aircraft then conducting a highly successful campaign against the Japanese forces. The threat to Australia had been averted and U.S. and Australian forces were pushing up the northern coast of New Guinea, eliminating one Japanese base after another. Air support was vital to this campaign but bomber missions to destroy enemy airfields had to have fighter escort if losses were not to be prohibitive. The Fifth Air Force's appeal for fighters was met by the 348th and its P-47s. The Fifth Air Force was disappointed; it wanted P-38 Lightnings for its operations. The dense jungle and wild terrain of New Guinea confined this war largely to the coastal strip and the Japanese had established bases at strategic points all along 'the back' of New Guinea. Range was vital because these bases, targets for Fifth Air Force bombers, were often a hundred or so miles apart and most at extreme range for P-47s flying from Port Moresby. This was a remote theatre of war with difficult supply facilities and the large appetite of the Thunderbolt for fuel was another matter not to the liking of Fifth Air Force. Although a great deal of technical data on P-47 combat operations in Europe had been channelled into reports available to the



The XP-47H was test vehicle for the Chrysler engine which incorporated many novel features aimed at giving high power with minimum vibration. This is the first aircraft. (Photo: Hal Martin)





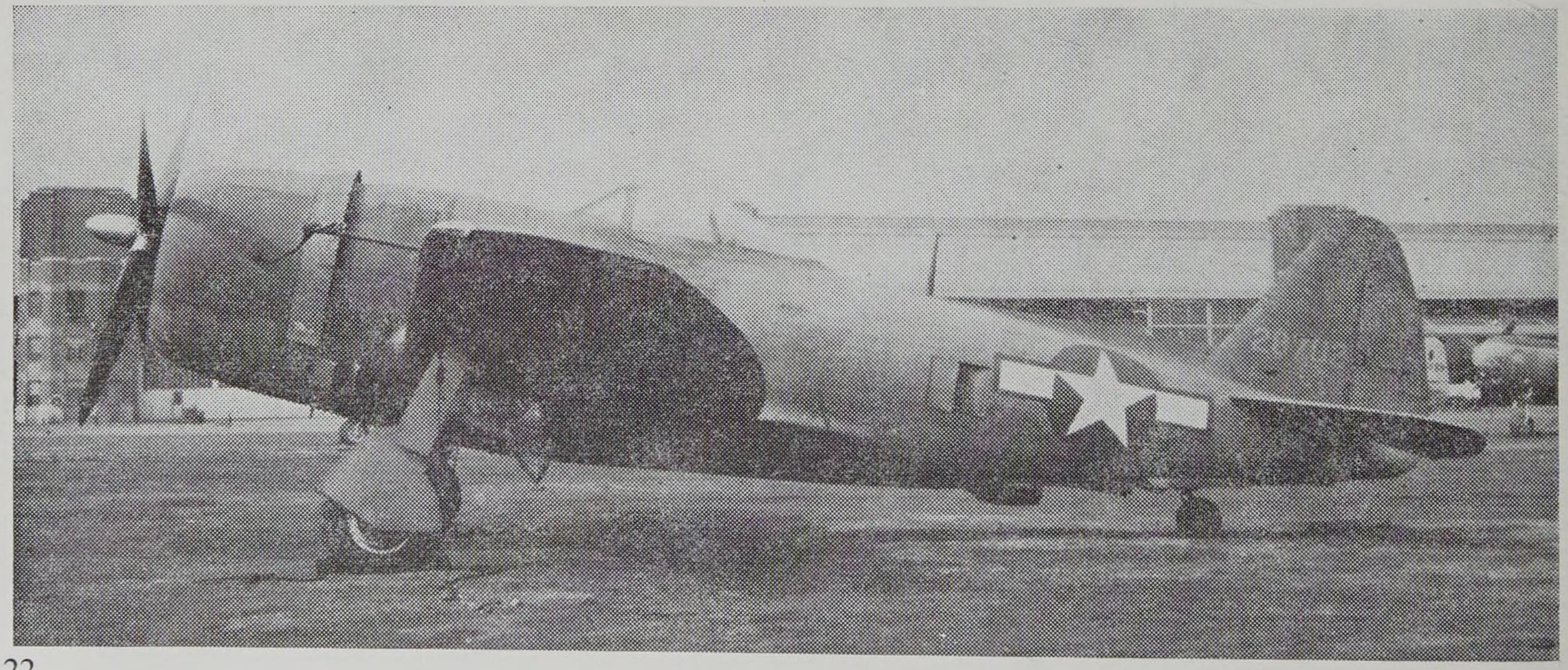
The fuselage structure of XP-47J differed in many ways from production Thunderbolts, as can be seen by comparing this photograph with others. (Photo: Republic)

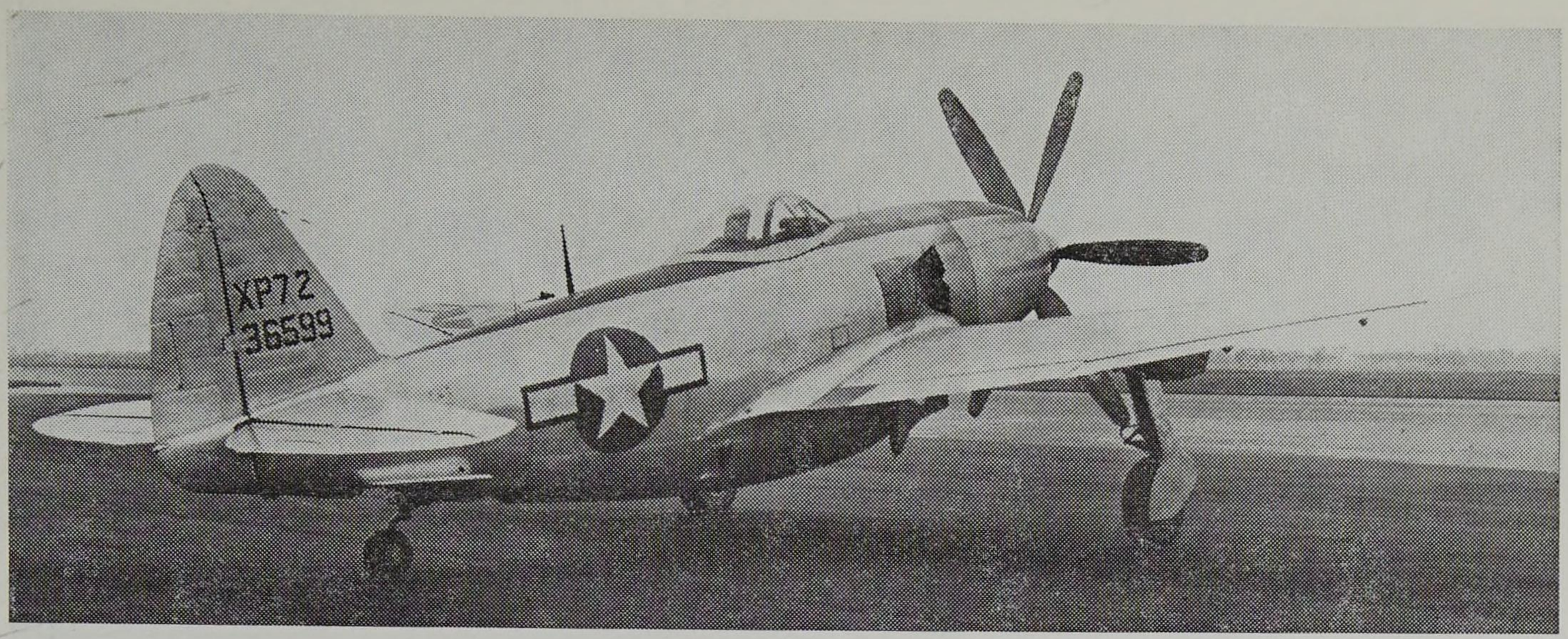
Fifth Air Force much was not applicable to its use in the different environment of the south-west Pacific. Before the 348th could be sent into action six weeks were spent by the Fifth Air Force Service Command in designing and constructing a 200 gallon drop tank to fix on the belly shackles, as well as installing an auxiliary feed system. This averaged about 300 man hours per aircraft, each tank being hand made. The results were worthwhile for the extra fuel increased radius of action from 200 to 320 miles. Attempts were made to get the tank produced in Australia but various obstacles led to an appeal for a suitable tank from the U.S.A. A shipment of 150 gallon tanks was received some weeks later but these needed considerable modification to instal under the Thunderbolt.

The 348th's first combat mission came in late July and the Group was soon embroiled in combats with Japanese fighters. The chief types encountered over New Guinea were the Kawasaki Army Type 3, the Nakajima Army Type 1 and the Mitsubishi Navy Type 0—the famed Zero-sen. Because of the difficult designations the Allies allotted code names to all first-line Japanese aircraft and these three were labelled Tony, Oscar and Zeke respectively. A general characteristic of Japanese fighters was their light weight and excellent manoeuvrability, and Allied pilots had learned not to engage them in a turning fight if it could be avoided. This dictated similar tactics to those that Thunderbolt units were employing over Europe; diving attack from altitude and then a zoom climb away. This had been employed with considerable success by P-39s and P-40s which were no match for the Japanese fighters in a dog-fight. The P-47 with its great speed and heavy armament was ideally suited for such attacks which the enemy could only escape if forewarned in sufficient time to take evasive action. As over Europe, the Thunderbolt was at a disadvantage below about 15,000ft. where the Zeke and Tony could easily out-climb it. For the sake of performance, Japanese fighters lacked armour and self-sealing fuel tanks and once hit often burst into flames. Japanese fighter pilots were generally skilful and highly trained but their aircraft were designed for dog-fighting, and were thus at a disadvantage in the hit-and-away tactics of their opponents.

Commander of the 348th Group Lieutenant-Colonel Neel Kearby, was appreciate of the situation and soon led his men to make good use of the Thunderbolt in bomber escorts and harrassing sweeps over enemy airfields. His own prowess as a fighter pilot was considerable and he quickly ran-up an impressive score. The most remarkable of the

First Thunderbolt with a bubble canopy, XP-47K was later the first to have the long-range wing with integral fuel cells. (Photo: Hal Martin)





The ultimate in Thunderbolt development was the XP-72. The biggest limitation was the engine's appetite of 350 gallons an hour at full power. This is the second aircraft. (Photo: Republic)

combats in which he was involved came on October 11, 1943. His report on the operation reads as follows:

'I was leading a flight of four P-47s on a fighter sweep. We arrived over Wewak at 28,000ft. The weather was excellent with a few scattered clouds between 2,000 and 8,000ft. We saw a number of aircraft parked on Boram strip and one aircraft taxiing on the runway. He did not take-off!

'The fuel in our belly tanks had been consumed, so we dropped them to increase our speed and conserve fuel.

'One Zeke was sighted at 8 o'clock below at 20,000ft. I came in on him from 7 o'clock above and opened fire at 15,000ft. He took no evasive action, caught fire and dived into the sea.

'We climbed back to 26,000ft. Saw about 34 fighters—Zekes, Hamps and Tonys—at 10,000–15,000ft., and 12 bombers, type unidentified, at 5,000ft., approaching from the east.

'Our P-47s came in from above on a Zeke, opened fire at 1,500ft. and closed as he burst into flames. He took no evasive action. I turned slightly and opened fire on a Hamp at 1,500ft. from 7 o'clock. He burst into flames. No evasive action was taken. I looked up and another Hamp was turning slightly to the left. I closed to 1,500ft. and opened fire from slightly above and from about 8 o'clock. He burst into flames as he passed beyond my sights in the turn.

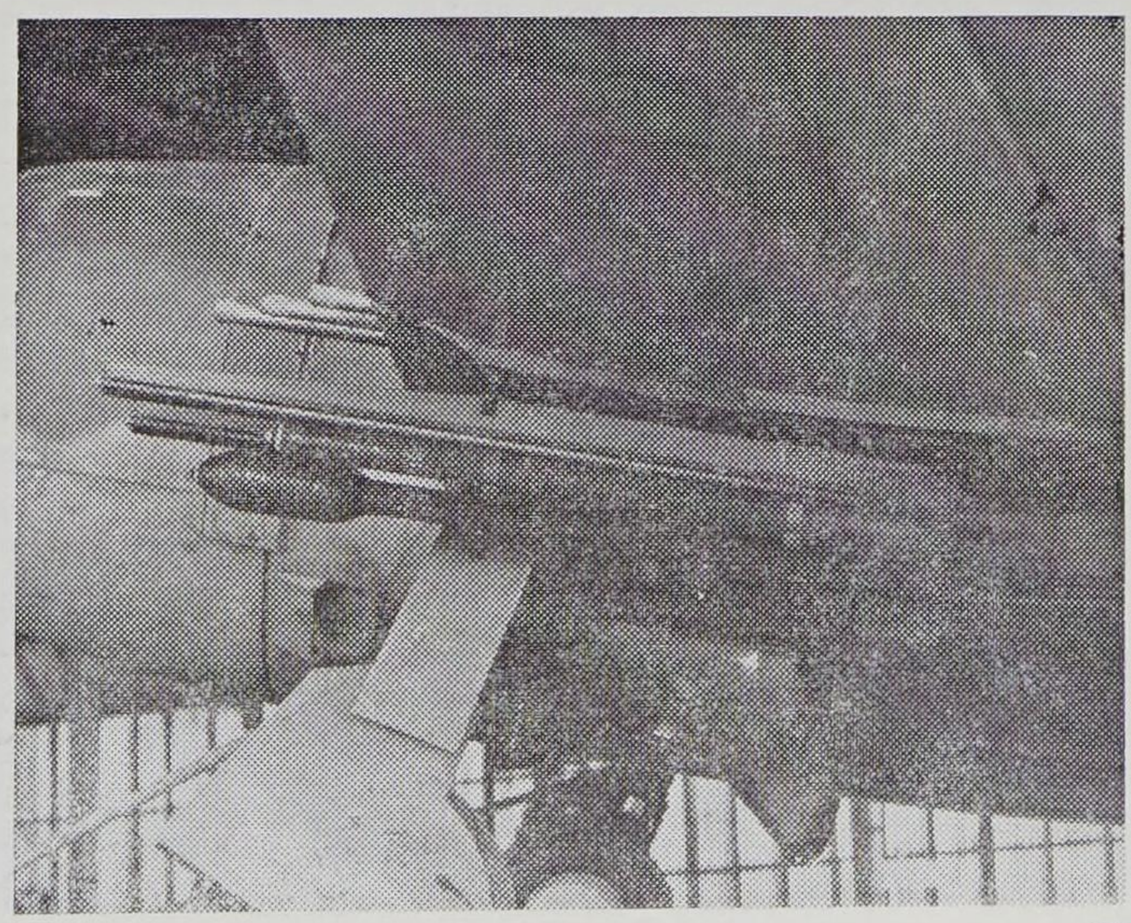
'The Nips realised we were there, so I pulled up sharply to about 20,000ft. and started for home. Immediately at 2 o'clock below at about 20,000ft. I saw a P-47 with one Tony about 3,000ft. to the rear and another about 3,000ft. behind the first one. I turned and came in at 400m.p.h. on the tail of the rear Tony, opening fire at 1,500ft. He took no evasive action and burst into flame.

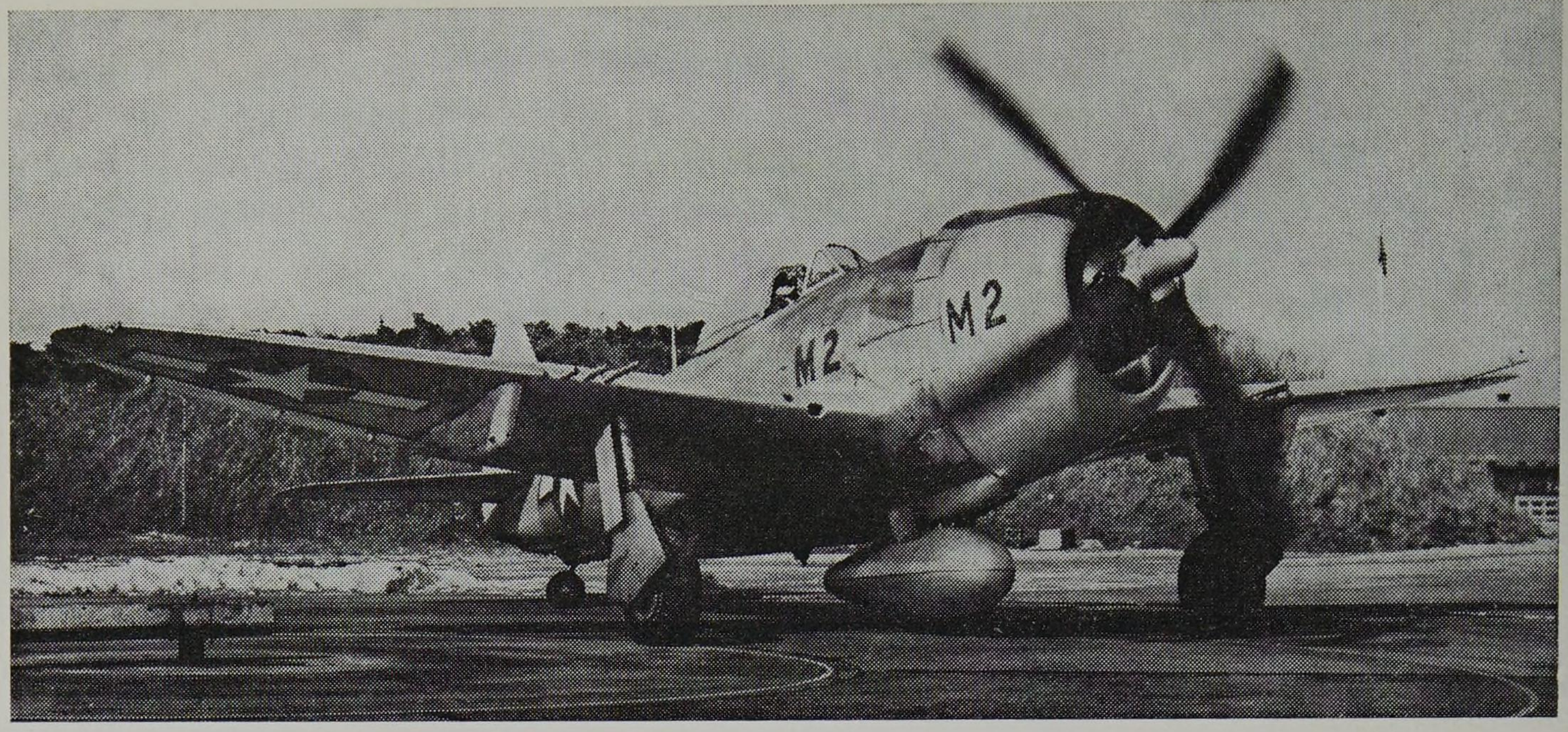
'I closed for the other Tony but he must have seen me and dove down in front of me. I opened fire from about 2,000ft. closing in and saw tracers going into him and pieces of his wing and fuselage flying off. I did not see him catch fire, nor did I see him crash. (A captain in the P-47 flight saw this aircraft burst into flame and crash in the sea). Tony's were all over the sky. I made a pass at a Tony from about 10 o'clock but deflection was wrong. I looked and saw a Tony closing in on my tail so I dived for the nearby clouds. When coming out of the clouds I could no longer see the Tony. I climbed to 15,000ft. and called the flight. They all checked and proceeded to Lae where we peeled off to land.'

For this action in which he had destroyed six enemy aircraft single handed, Colonel Kearby was later awarded his country's highest decoration the Medal of Honor, first to an Army Air Force fighter pilot. It is notable that all six victims caught fire and the vulnerability of Japanese aircraft to incendiary bullets allowed the Thunderbolt pilot to open fire at twice the range —his European counterpart usually needed to obtain a kill. Another factor influencing these hits at long range was the stability of the P-47 when the guns were fired. Despite the heavy armament the Thunderbolt would continue firmly on course when a torrent of bullets was set flowing.

Engine failures were the principal difficulties with the P-47D in New Guinea and were probably due to similar causes found for this trouble in Europe. By and large the aircraft proved very dependable despite the debut in a new environment. Minor modifications had to be made but this was a continual process throughout the aircrafts' operational life to better reliability and was, of course, common to all aircraft types. Occasionally some interesting engineering matters arose, such as that triggered by a landing mishap involving a 348th aircraft. The P-47 had individual wheel brakes pedals and in this incident one pedal became partly detached and fell forward jamming in the pilot's foot-trough. The aircraft immediately veered off the runway and ended up in a

British rocket rails and missiles on P-47D 42-8053. (Photo: Air Force Museum)





The second YP-47M, 42-27386, on test at Farmingdale. Drop tank is standard U.S. built 110 gal. capacity. (Photo: Republic)

drainage ditch. On inspection it was found that a retaining washer was missing from the brake pedal assembly, and it was also discovered that the same washer was absent from the assembly on many other P-47s on the airfield. A report forwarded to the United States, brought an inspection of all P-47Ds and it was found that there had been a wholesale omission of this washer during manufacture. The same item was also missing on some older models. All told over 2,000 Thunderbolts had been in jeopardy because of this assembly line error, putting some $233,000,000 at stake to say nothing of the human lives. Happily the omission was discovered in time.

Range problems continued to occupy a good deal of attention, particularly as in some escort missions enemy interception had forced P-47s to jettison their drop tanks at an early stage leaving insufficient fuel to fly all the way with the bombers. A larger internal supply was needed and with considerable ingenuity Fifth Air Force engineers managed to find room for another 42 gallon fuel cell aft of the pilot by repositioning the radio and other equipment. This fitment, however, tended to affect the handling of the aircraft and was not at all popular with pilots. Moreover the weight of all this fuel—when drop tanks were carried as well—was more than the tyres could withstand, especially in the high temperatures. Several bursts on take-off brought fatal crashes and faced with this new limiting factor the additional fuel cell was dispensed with and a maximum load of around 505 gallons specified for safety.

In December 1943, some 300 P-47s were available in Australia and New Guinea and Fifth Air Force converted the 35th Fighter Group from P-39s to the Thunderbolt. A new group, the 58th arrived from the United States in the same month and was also equipped with Thunderbolts. The three P-47s groups would support the re-conquest of New Guinea and follow the 'island hopping' campaign that would culminate in driving the Japanese from the Phillipines. Their role, however, gradually changed as the Thunderbolt was found to be admirably suited for duties that were in complete contrast to the original conception. This new role was about to be played very forcefully in Europe.

DOWN TO EARTH

BY the end of 1943, P-47 production had reached its peak, 660 aircraft per month and throughout the following year the daily average would be over 20. A new Republic factory at Evansville, Indiana had commenced production of the P-47D in December 1942 as had Curtiss Wright at Buffalo. The Curtiss built aircraft were to the D model specification but were designated P-47G. Their production was tailed off early in 1944, ceasing in March, and in any case the majority of the 354 aircraft built were assigned to training units in the United States. In addition to the New England training area another group of airfields in the Carolinas and controlled from Richmond Army Air Base, Virginia, were busily turning out proficient Thunderbolt pilots, most of whom were being funnelled into new combat groups destined for the Ninth Air Force, newly established in the United Kingdom. The Ninth was a tactical air force specially reformed as the United States contingent of the Allied air forces committed to support the forthcoming cross-channel invasion and subsequent land campaign in western Europe. The Ninth received 18 fighter groups during the first three months of 1944, no less than 13 being equipped with P-47s making it the largest user of the type. Next in line was the Eighth Air Force which had received its full compliment of 10 P-47 groups by the end of 1943 but was intent on converting most to the new P-51 Mustang which was considered more suited to long range escort. (One group was in fact exchanged for a Ninth P-51 group). By May 1944, there was a total of 20 Thunderbolt groups in the U.K. with some 1,800 aircraft making it the most prevalent combat type in operational squadrons on that densely populated aircraft carrier.

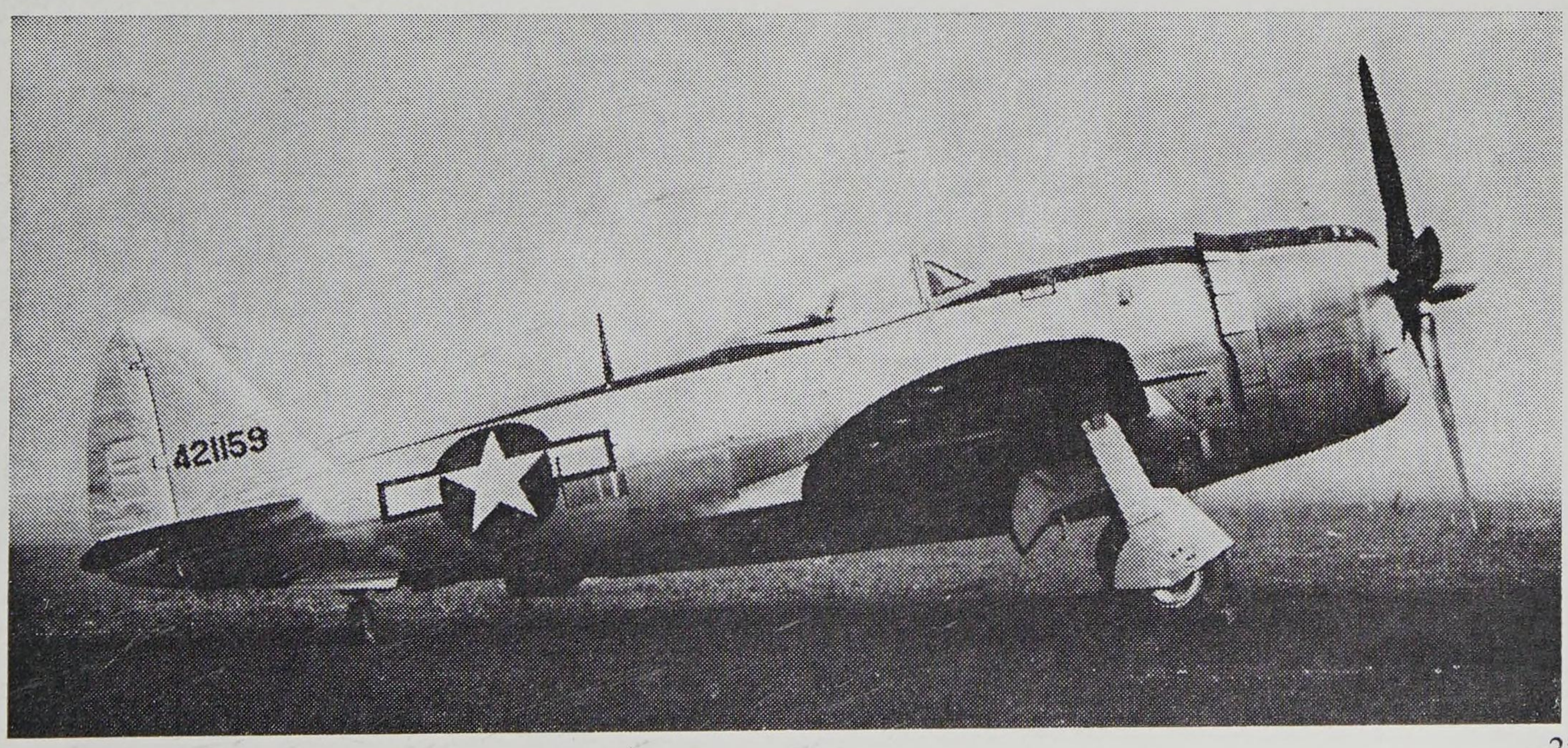
The question might well be asked; what was a high altitude interceptor, lately cum escort fighter, doing in a tactical air force in such profusion? The answer is best given in terms of the developments both technical and tactical that had occurred since the uneasy debut of the Thunderbolt over western Europe.

XP-47N under test. (Photo: Republic)

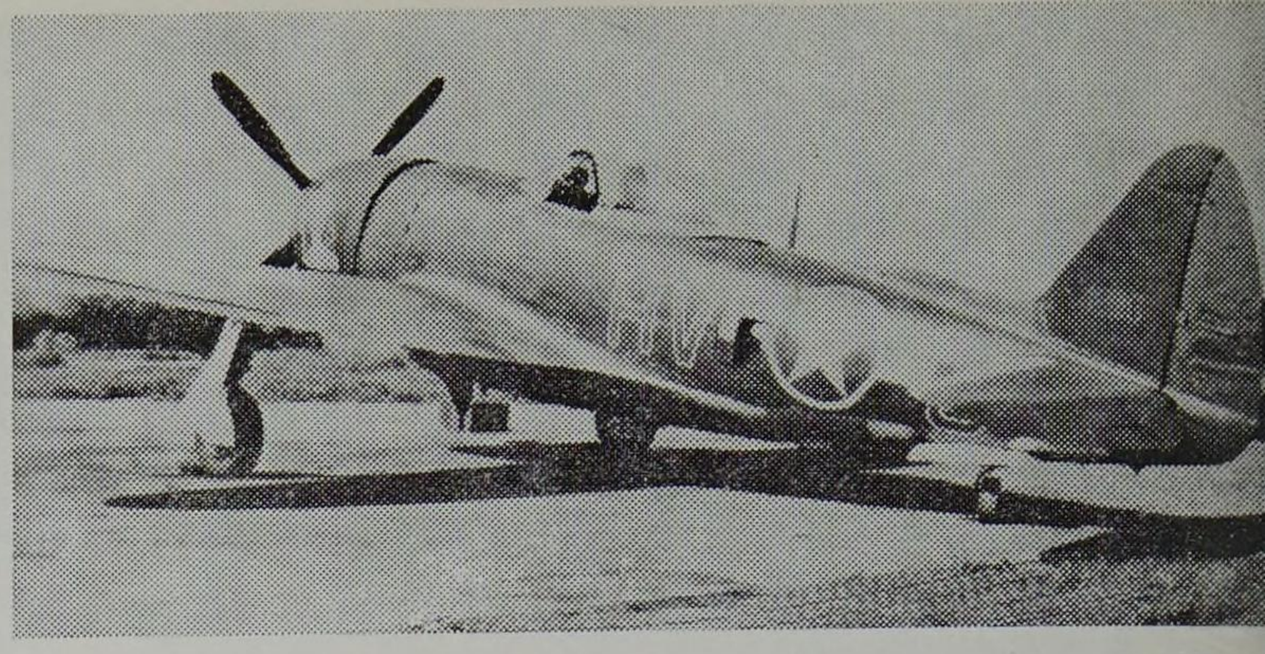
The fighter groups of the Eighth Air Force, spearheaded by the 56th Group went from strength to strength in the autumn and early winter of 1943. As pilots came to be more familiar with the Thunderbolts' pecularities so they were able to extract better performance from the giant and enhance its value as a fighter. They learned that providing the throttle was kept well forward the aircraft would manoeuvre around a vertical axis in a fantastic manner which few other Allied or enemy fighters could duplicate. Its ability to carry out the 'Split-S' manoeuvre (roll over and make a curving dive to finish up flying in the opposite direction from which the manoeuvre was started) was also unsurpassed. Confidence bore success and time and again P-47 squadrons would return from a mission with high scores in combat. In Zemke's 56th many pilots were running their personal scores into double figures; men like Gerald Johnson, Robert Johnson, Walker Mahurin, David Schilling and Hubert Zemke himself.

The introduction of locally made 108 gallon drop tanks had enabled Thunderbolts to fly all the way to Emden in September and with new groups becoming operational the Fortresses and Liberators were being given continuous cover for 325 miles into enemy territory. Three technical improvements were in the offing and these were to improve and change the situation. The first was water injection, which allowed more power to be drawn from the Double Wasp. A tank holding 15 gallons of a water-alcohol mixture was installed on the bulkhead directly aft of the engine and a line plumbed into the fuel intake. By operating a switch on top of the throttle control the water mixture was allowed to pass into the combustion chambers checking a dangerous rise in cylinder head temperature, while manifold pressure was boosted to obtain an approximate 15% increase in power that pushed horse power up from 2,300 to 2,535 and top speed from 406–433m.p.h. The consumption of water was about a gallon a minute and the system was only intended for short bursts of power in emergencies. Nevertheless, it gave performance increases at lower altitudes that made a substantial difference to the Thunderbolt's rating against its adversaries. Pitted against an FW 190A, a P-47D with water injection would still not match the Focke-Wulf's initial acceleration but at low altitude—5,000ft.—this was reduced to a 200yd. initial gain which the P-47 thereafter quickly reduced. In climbs, again the FW 190 would pull away but the P-47 quickly overtook it and

Fresh from the factory, one of the 130 P-47Ms produced. This aircraft served with the 62nd Fighter Squadron until being destroyed in a flying accident in March 1945. (Photo: Hal Martin)



then outclimbed it by 500ft. a minute. The P-47 could out-turn the FW 190 with ease provided the speed was kept above 250m.p.h. Only when speeds fell below this point was the P-47 at a disadvantage. On these findings and the results of actual encounters when P-47s had been intercepted at low altitudes there was no reason to doubt that a well trained pilot in a P-47 could not care of himself. On the P-47D-11-RE and 11-RA engine water injection was automatically engaged when the throttle lever entered the last eighth of an inch of its travel. These factory installed engines with water injection were designated R-2800-63. Kits were available for modifying the R-2800-21 of earlier C and D models. Hard on the heels of water injection came the 'paddle blade' propeller. which as its colloquial name suggests featured wide blades that enabled the P-47s new found power to be used more efficiently.



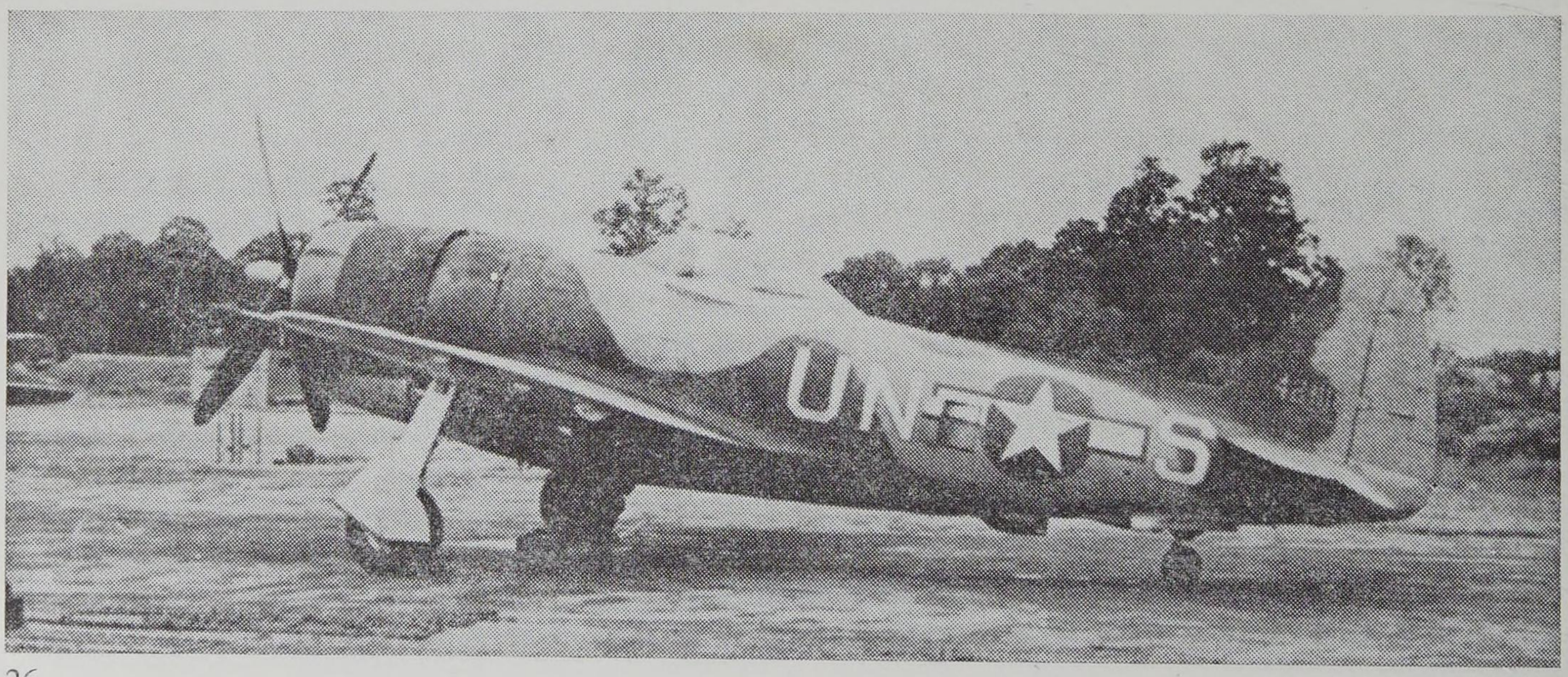
'Lorene', P-47M, 44-21116 in the black and red decor of the 61st Fighter Squadron, Boxted, England, April 1945 (Photo: T. Mitchell via R. C. Jones)

Third engineering advance that had an important effect on the employment of the Thunderbolt was the installation of stores shackles under each wing to carry bombs or drop tanks. These were at first attached by depots in the theatre and required a considerable number of man hours, the control mechanism and fuel line plumbing being difficult to instal. To equip every P-47 in the Eighth and Ninth Air Forces took many weeks. For the Eighth this fitment allowed a 108 gallon drop tank on each wing shackle and immediately added 150 miles to the P-47s range. For the Ninth Air Force it allowed two 500lb. bombs to be carried under the wings and a 75 gallon drop tank under the belly. The combinations were many but it gave the P-47 new versatility. The shackles were embodied in small pylons extending from the undersurface of the wing. They had one detrimental effect in that their air resistance clipped 45m.p.h. off the maximum speed. A redesigned more streamlined pylon reduced this loss to about 15m.p.h.

Back in July 1943, Lieutenant Quince Brown of the 78th Group had been forced to fly his P-47 at hedge-hopping altitude over enemy occupied territory on his return from a mission. En route he peppered a gun emplacement and a train. Such action was not officially condoned but from time to time similar incidents occurred. When there were signs that the Germans were conserving their fighter force and keeping them on their airfields, orders were given to the effect that pilots could go down to straf airfields. They needed little encouragement and returning from an escort mission with ammunition to spare squadrons would 'drop-in' on a Luftwaffe airfied and shoot at any aircraft in sight. It became a very dangerous occupation as the Germans increased anti-aircraft defences which they hoped would act as a deterrent. In March 1944, a special flight composed of P-47s and pilots drawn from several groups in the two air forces was formed expressly to work out the best tactics to use in strafing airfields and other ground targets. The principal finding from these experiments—conducted against targets in France—was that surprise was essential if losses were to be kept low. Airfields, in particular, should be approached from 'zero' altitude so as not to alert enemy gunners until the last possible moment. For this reason a second run at the same target was considered ill advised. Strafing always remained a far more dangerous affair than air combat. Top ranking P-47 aces, Walker Mahurin, Walter Beckham and Glenn Duncan were all brought down by ground fire—but all escaped with their lives.

The 353rd Fighter Group which was host and mentor to the special strafing flight at its base, Metfield in Suffolk, also pioneered the Thunderbolt as a fighter bomber in Europe. On 25th November 1943 it carried out the first dive bombing mission, each aircraft involved carrying a 500lb. fragmentation bomb on the fuselage shackles. The target was an airfield in France and the object more of nuisance value with the intention of bringing up enemy fighters rather than to cause any substantial damage to facilities on the field. Bombs were released at about 10,000ft. after

P-47M-1-RE, 44-21118 on a dispersal point at Boxted in the spring of 1945. The 63rd F.S. camouflaged its P-47Ms in dark and light blue on the upper surfaces, and decorated them with sky blue rudder and tail numbers, while the code letters were polished bare metal! This particular aircraft was usually flown by Lt. Arthur T. Shupe. (Photo: Col. J. F. Keeler, U.S.A.A.F., via R. C. Jones)

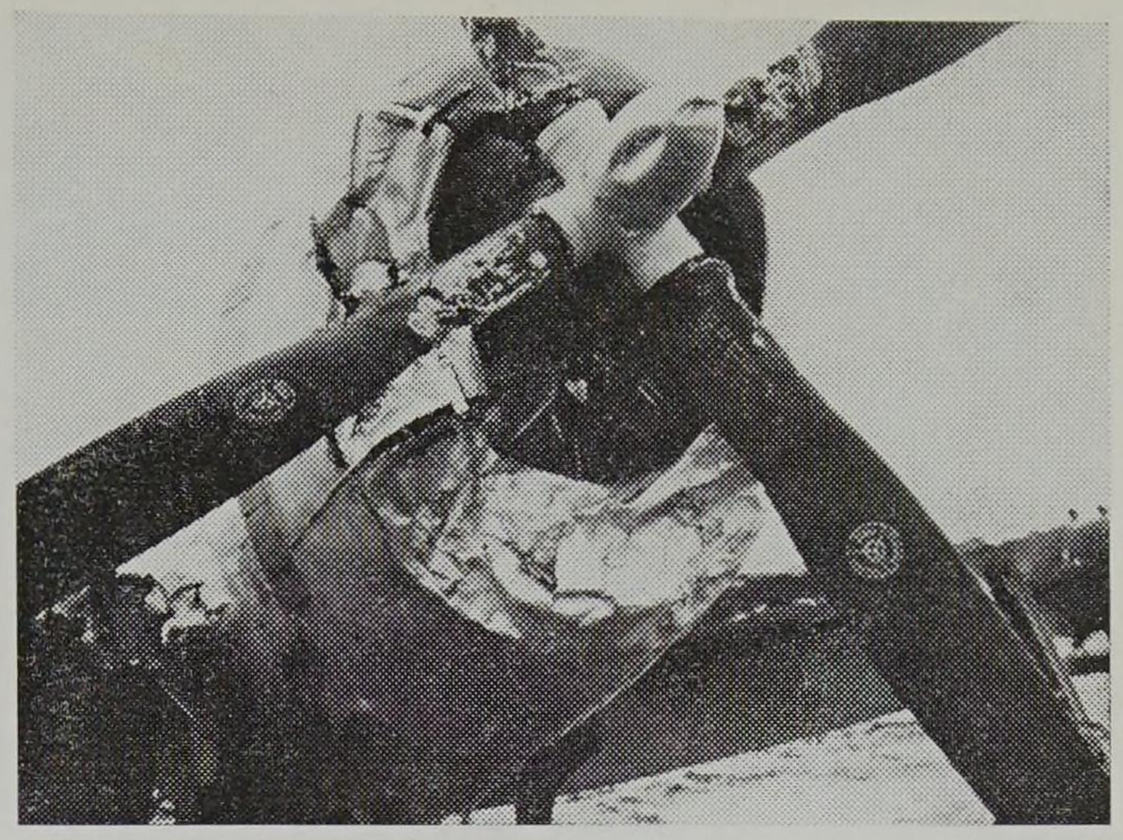


'Flak Happy' and friends in the 345th Fighter Squadron, 350th Fighter Group. These D-27s are each carrying two 110 gal. drop tanks on wing pylons and a single 75 gal. tank under the fuselage. (Photo: U.S.A.F.)

a 5,000ft. dive. Not a great deal of harm was done to the airfield—and flak set fire to the main fuel tank of the P-47 flown by the Group commander Colonel McCollom, who had to bail out. Other dive bombing attacks followed this inauspicious opening and results improved. The new 353rd C.O., Lieutenant-Colonel Glenn Duncan and one of the squadron commanders, Major Walter Beckham, experienced in angles of approach and altitude. Due to the difficulty of pulling the Thunderbolt out of a dive at low altitude—it always had a reluctance to leave its earthward plunge —low level dive bombing from steep angles was dangerous. The other consideration was anti-aircraft defences, so most of these early dive bombing missions were initiated at altitudes around the 15,000ft. mark with releases at between 7–10,000ft.

Another experiment with P-47s featured mass formation bombing from high altitude. Using a Liberator bomber to lead, make the target sighting and give the release signal for the P-47s to drop their 500lb. bombs, the 56th Group tried this tactic over enemy airfields. Trailing the slow bomber made this a dangerous practice giving enemy flak gunners an opportune target.

In April the Ninth Air Force P-47 groups underwent intensive training in the arts of ground attack and dive bombing. The considerable experience of fighter bomber units in North Africa formed the basis of the techniques advised although these were gained with other types of fighter. Glide bombing—steady shallow angle approaches to a ground target—and other modes of attack were practised, and practice was the decisive



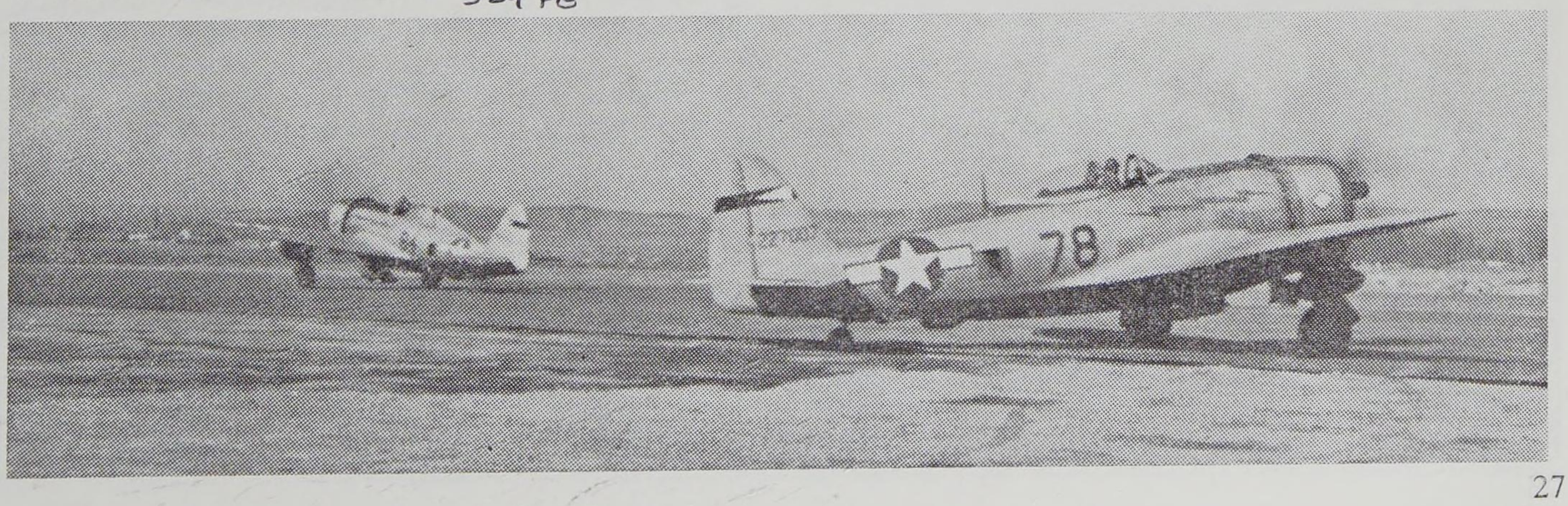
The result of flying through tree tops. Lt. Richard Sulzbach flew this 346th Fighter Squadron aircraft back to an Italian airfield after a mishap while ground strafing. (Photo: U.S.A.F.)

factor in pilots being able to drop bombs in close proximity to a target.

Most of the expertise in using the P-47 as a fighter-bomber was obtained the hard way through raids on the enemy communications system in France and the Low Countries prior to the invasion. Daily, Ninth Air Force groups went out to bomb bridges, seal tunnels, block rail lines and destroy trains. New methods of approach and of evading ground fire were tried. The evidence of destruction that the gun cameras of returning aircraft brought back told of the effectiveness of the P-47s firepower. The eight ·50 guns pushing out 773lb. of bullets per minute could penetrate a locomotive's boiler and disintegrate many a road vehicle. It was quickly realised that the Thunderbolt's guns alone made it a most potent ground attack vehicle.

The Ninth Air Force Thunderbolts really came into their own after the invasion and the break out of the U.S. land forces at St. Lo in July. U.S. tanks had VHF radios to enable them to communicate directly with the P-47 pilots and in this way they could call in the Thunderbolts to deal with any enemy tank or gun position obstructing their advance. Thunderbolts flew, whenever possible, armoured-column co-operation missions. A flight of four or eight bomb laden P-47s would circle the leading elements of the armoured-column ready to be called into action, while above another flight of P-47s would afford top cover in case German fighters appeared on the scene, which was infrequent. There were occasions when bomb laden P-47s were 'bounced' by Me 109s or FW 190s at low altitude with heavy loss to the former. Forewarned the P-47s could and did master such interceptions. Ground fire continued to be the greatest

A bomb laden P-47D-27-RE of 316th Fighter Squadron (identified by white flashes on cowl and fin) taxies out from the base at Luneville, France, for a ground-support mission. 324 FG

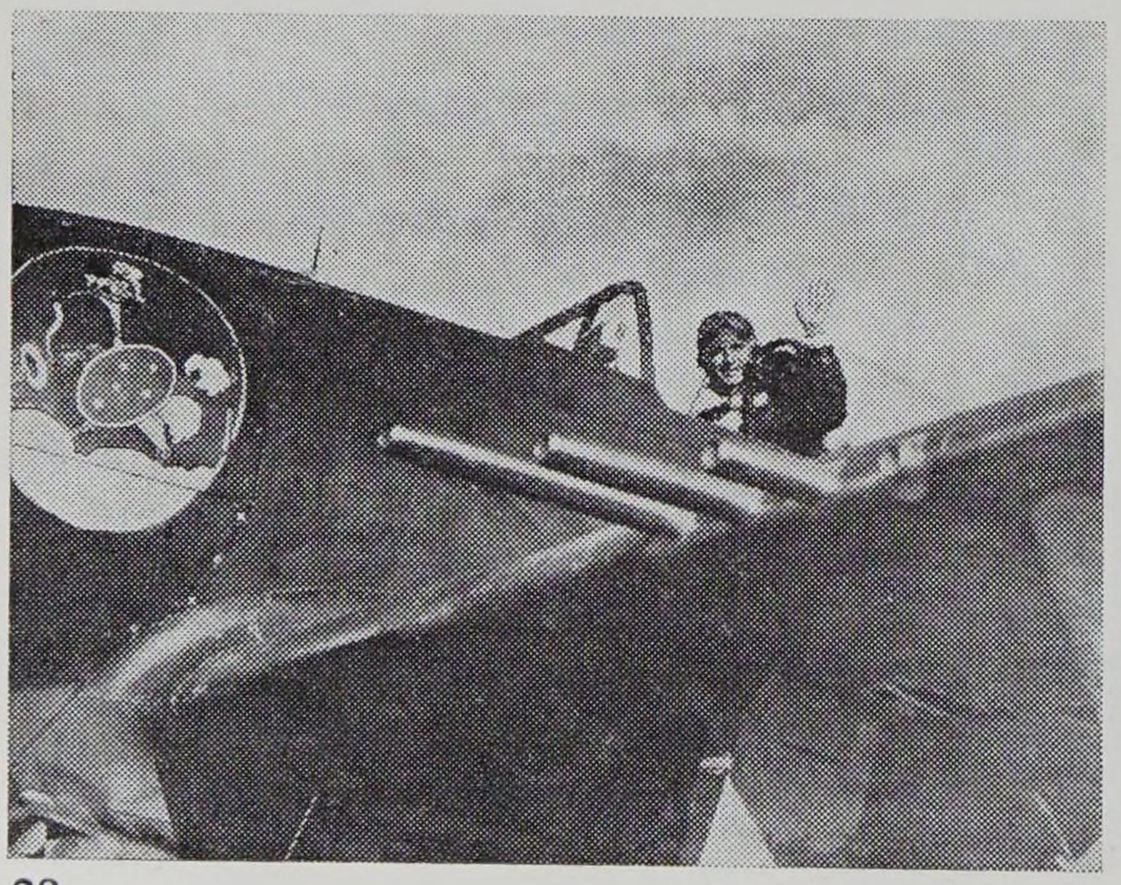


Thunderbolts of the first Free French squadron to go into action in southern France. The French camouflaged all their wartime P-47s. (Photo: U.S.A.F.)

hazard and it was always necessary for P-47s to patrol above 3,500ft., beyond the range of the light flak defences of the German army. The ability of the P-47 to take many hits and still fly on was already well known but in fighter-bomber duties the value of this hardiness was never more evident. The liquid cooled engines of fighters such as the Spitfire, Typhoon and Mustang were extremely vulnerable whereas the P-47s radial could sustain severe damage yet still keep running. Without doubt a pilot's chances of survival were much higher in a Thunderbolt than any other type employed on the same duties.

In July 1944, a new weapon had been introduced on the Thunderbolt. The success of the British air to ground rocket projectiles had led the U.S.A.A.F. to experiment with similar installations. The first type installed on the P-47 was a development of an infantry weapon and featured a cluster of three launching tubes slung below each wing directly under the gun compartment. First Ninth Air Force unit to receive these launchers for 4·5in. rockets was the 406th Group's 513th Fighter Squadron, a unit which had the distinction of claiming the first V-1 flying bomb shot down by a U.S. pilot. First use of the rockets was against ammunition trucks at Gavray, France on July 29. The weapon at first proved difficult to aim and was not particularly favoured by pilots who considered it had a detrimental effect upon performance. The squadron was caught unawares on one occasion by some Focke-Wlufs and four of the rocket laden P-47s were shot down. Again, practice was required and eventually the rockets were used with good effect against tanks and other armoured vehicles.

2nd Lt. Jorge Taborda of 1 Grupo de Aviacao de Caca (unit insignia on nose) in the cockpit of 42-26771. Note ring and bead sight detail. (Photo: U.S.A.F.)



While the thousand Thunderbolts of the Ninth Air Force blasted a way across France for the U.S. contingent of the Allied expeditionary force, other P-47s were meting out punishment to enemy ground installations on the Italian battle front. In the spring of 1944 the Twelfth Air Force, charged with tactical operations in that theatre, commenced the conversion of its six fighter groups from a mixed force of P-39, P-40 and A-36s to the P-47D. The mountainous terrain did not allow any startling armoured advances as in France and it also made the support operations of the air elements far from easy. The P-47, however, was used with effect by these units and soon became very popular with air crews and maintenance men alike. The first P-47 group in the Mediterranean theatre had been the 325th, which began converting to the type in October 1943, and started operations as an escort group in the strategic missioned Fifteenth Air Force early in December. Tutored by experienced P-47 leaders from the Eighth Air Force the 325th soon mastered the Thunderbolt's idiosyncracies and used it to good account in combat. One pilot, Major Hershel Green, claimed six of the enemy on a single mission and all told ran up a score of 10 destroyed before the group converted to Mustangs. Another group using the P-47 on escort work was the unique 332nd Group, the only Negro staffed fighter organisation in the whole U.S.A.A.F. This group too, soon converted to Mustangs which were now favoured for the bomber support role. Advanced German fighter types were appearing and the P-47s performance and range were once again the factors in its employment as an interceptor. Back in the United States however, Alexander Kartveli and his team had not been idle and would shortly introduce a rejuvenated Thunderbolt.

QUEST FOR SPEED

LEGEND has it that when asked what he thought of his creation, Alexander Kartveli replied 'Nice 'plane. But eet iss *too* beeg'. Events were to prove that any de-merit through size was more than made up for by the aircraft's virtues. Size was one thing, weight was another, and there was always a tendency for this to increase as a design evolved. It is understandable then, that having given birth to a colossus, Republic were conscious of the need for restraint in increasing the burden. This in turn led to the consideration of a special lightweight, higher-powered version to bring the P-47 nearer its contemporaries in the matter of pounds weight.

While such a project was reviewed the breed as bred had to be advanced in ways which would maintain its viability in the fighter field without causing serious hold-ups in production. The Army Air Force needed aircraft to fight the war and manufacturing changes cost precious time.

Two P-47Bs were taken from the production run in the spring of 1942 and one re-worked to feature a pressure cabin with its attendant advantages to a pilot in high altitude flight. Designated the XP-47E, the pressure cabin Thunderbolt got no further than the prototype stage but it provided valuable experience for later designs. Nor did the other P-47B modification, known as XP-47F. A special laminar–flow wing with low drag properties was built on to this machine —41-5938—but offered insufficient advantages over the standard wing with its Kartveli designed airfoil section to warrant further consideration for the P-47. The wing plan form was quite unlike that of the standard Thunderbolt, featuring straight, tapering edges with rounded tips. Span was greater being 42ft.

After tests at Wright Field during the fall of 1942, XP-47F was returned to Republic at their Evansville plant. Further trials ensued to obtain data on the low drag wing for the National Advisory Committee for Aeronautics. The aircraft was destroyed and the test pilot killed in a crash at Hot Springs, Virginia on October 14, 1943.

Chrysler had a 16-cylinder, inverted-vee, liquid-cooled engine under development and the P-47 was earmarked as a suitable vehicle for flight testing its 2,500h.p. designed to be available at 30,000ft. Like so many aircraft engines development took a long time and the two P-47D-15-RAs taken from the Evansville line in late 1943 to become XP-47Hs languished in a hangar for many months while the installations were effected and the engine tested. So much difficulty was experienced with the engine that not until July 26, 1945, after the cessation of hostilities in Europe, did the first XP-47H take to the air.

XP-47H was never a serious contender for the battlefield but XP-47J looked as if it might be. This was the designation given to the lightweight version of the Thunderbolt that had been projected in 1942 and approved for a construction contract in the following June.

The aircraft featured a new model of the Pratt and Whitney Double Wasp, the R-2800-57 'C' series engine, which had a maximum rating of 2,800h.p., and was specifically designed to obtain higher power without increases in displacement or weight. Previous 'twenty-eight hundreds' used in the P-47 were 'B' series.

The 'C' engine installed in the XP-47J had a special fan to aid cooling which also allowed a redesigned and more streamlined cowling. A new propeller and improved supercharger were fitted, while weight was saved by reducing the armament to six guns and 1,602 rounds of ammunition (standard D model had 2,136 rounds with its eight guns), fitting smaller fuel cells holding 287 gallons (as against 370), deletion of wing pylons and all shackles for external stores, and simplifying radio equipment. The aircraft made its maiden flight on November 26, 1943, but after accumulating only 10 hours flying time the engine showed signs of internal damage. A new engine was installed and flight tests proceeded during the spring of 1944. Speeds approaching the 500m.p.h. mark were being obtained with the XP-47J by mid-summer, with a run at 33,500ft. on July 11, 1944, at 493m.p.h. With the previously unattained magic figure of 500m.p.h.

Displaying the green, yellow, blue and white markings of Brazil, these P-47D-25-REs were a familiar sight at Pisa, Italy, during the last six months of the war. (Photo: U.S.A.F.)

Enemy view of a Thunderbolt. A red and white striped tail aircraft of the 86th Fighter Group delivers its load. Bologna, Italy, 1st December, 1944. (Photo: U.S.A.F.)

beckoning Republic installed a bigger diameter propellor and a more powerful supercharger. On August 5, 1944 a level speed of over 504m.p.h. at 34,450ft. was achieved, a record high for a propellor driven aircraft at that date and certainly for the war years. However, when the A.A.F. later tested XP-47J at Wright Field, 493m.p.h. was the maximum they could extract during an intensive flight programme and the Republic claim was thereafter treated with some suspicion.

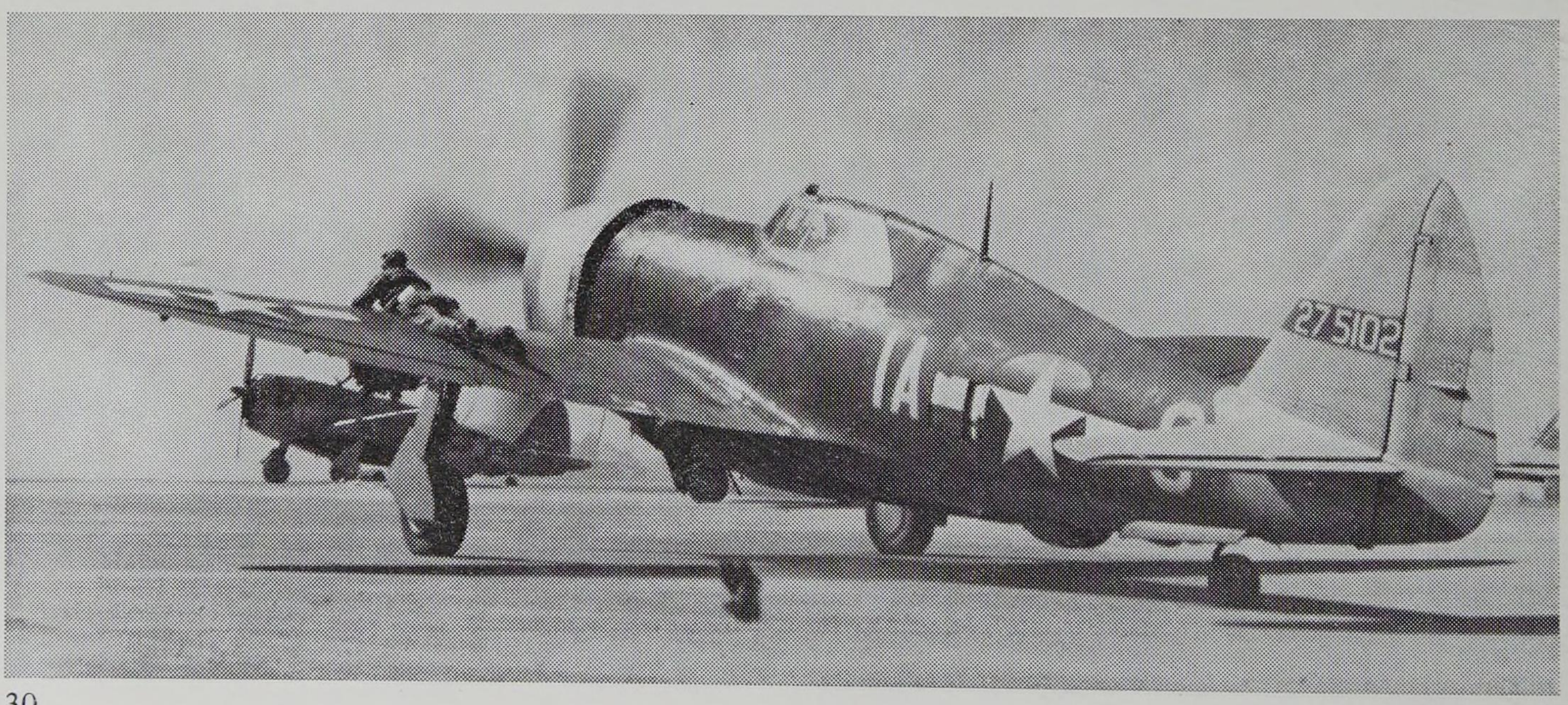
In any case, these speeds were obtained with minimum loading and when fully dressed for battle XP-47Js performance was not appreciably better than current P-47Ds. The primary reason that XP-47J was not considered for production was that Republic would have required to change some 70% of the actory tooling necessitating a break or falling off in production while this was carried out, a situation not acceptable to the customers, the Army Air Force. Additionally, like some of its forebears, the XP-47J had been eclipsed by a superior and more favoured design even before it flew.

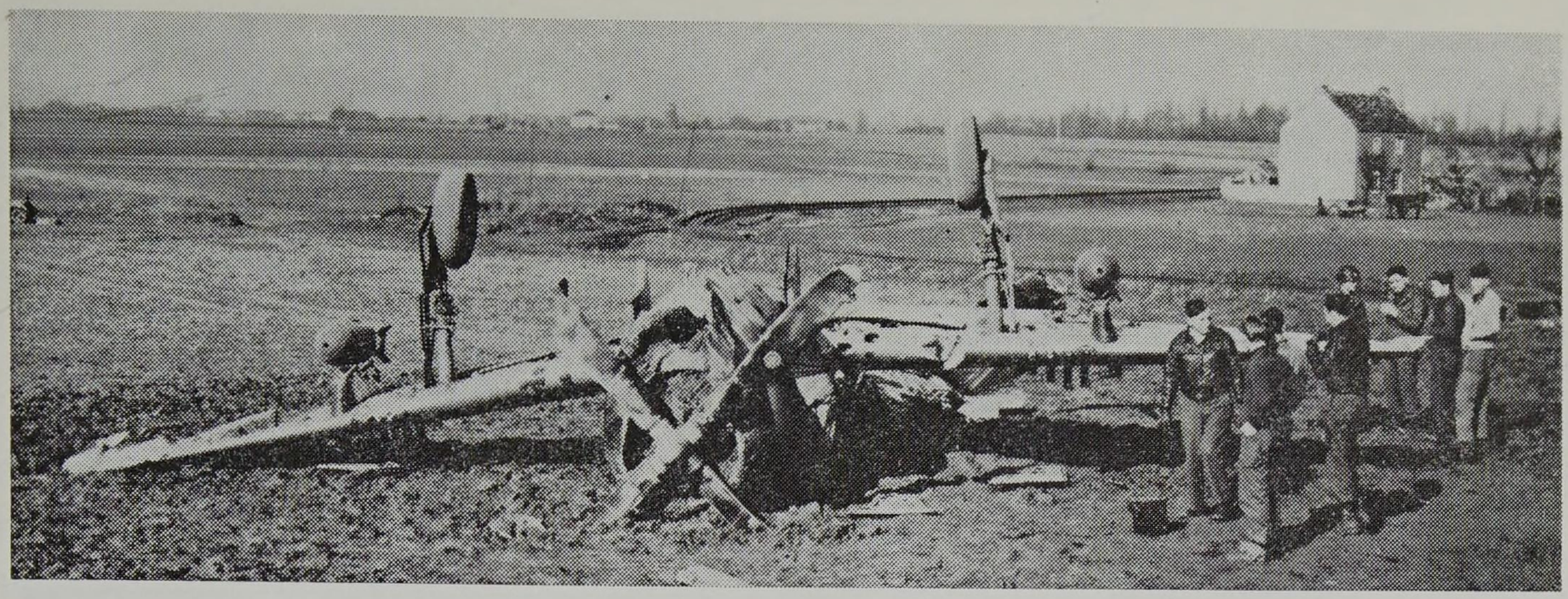
A few weeks after the Thunderbolt's first flight in May 1941 the prolific Kartveli was busy with two fresh fighter projects utilising new high-power radials from Wright and Pratt and Whitney. That with the Wright (XP-69) was an entirely new concept featuring the radial buried in the fuselage aft of the pilot and driving the propeller in the nose through an extension shafts. Full-sized mockups were built but a prototype was never completed due to the Army Air Force, favouring the parallel design, which promised a better performance, was not unorthodox, and used many P-47 components. This was XP-72 and was powered by the Wasp Major, rated at not less than 3,450h.p., a thousand more than the current production P-47Ds when two prototypes were ordered on June 18, 1943. The first flew in February 1944 and the second in July, the principal difference being that number two had contra-rotating propellers in place of the conventional four-blade type fitted to number one. More than 1,500lb. heavier than the P-47D, XP-72 featured only six wing guns, and other limitations to keep its gross weight down. The fuel consumption of the powerful engine hampered the aircraft's range potential, and the advent of jet engined fighters rendered its top speed of 490m.p.h. unspectacular, bringing about the cancellation of a production contract for 100 examples.

The techniques of mass production were such that XP-72, which although very much a Thunderbolt and visually akin to XP-47J, would—as with the latter type, too—have been too costly to introduce on the Farmingdale line as a natural progression. Thus improved versions of the Thunderbolt that did go into production were not radically different from their predecessors. To give all-round vision for the pilot, Republic followed the general trend and installed a bubble canopy on a P-47D-5-RE in July 1943, redesignating it XP-47K. The rear decking was cut down and radio equipment re-sited. This bodywork gave the Thunderbolt a much slimmer and more streamlined form.

Another D model served as a prototype for a redesigned main fuel tank to hold an extra 65 gallons, and increased oxygen supply (six cylinders in place of four) and other minor refinements, and this was labelled XP-47L. The improvements effected on both

A veteran P-47D-10-RE of 366th Fighter Squadron, 358th Fighter Group taxies along the sandy runway of its base at Sandhofen, Germany, in April 1945. Ground crew man rides on wing to direct pilot whose forward vision is obscured by aircraft's nose. (Photo: U.S.A.F.)





This Thunderbolt failed to become airborne at its Low Countries base. The pilot was extracted shaken but little harmed. The bombs were, happily, not dislodged from their shackles. (Photo: U.S.A.F.)

XP-47K and L were brought to the production line in February 1944 but a new model designation was not given, aircraft from both factories (Curtiss production had tailed off) being identified as D-25-RE and D-26-RA, and these began reaching operational squadrons at the end of May.

These new models were some five or six miles per hour slower than the P-47D-22-REs and P-47D-23-RAs they superseded. The extra 65 gallons of fuel, however, gave up to 230 more miles in range and increased endurance by an hour.

A 30-day test carried out by the A.A.F.'s Proof Testing Section at Eglin Field, Florida to ascertain range capabilities and flight characteristics of the bubble canopy P-47, found no measurable effect on turning radius or any significant undesirable traits. This is interesting in view of the not infrequent problem of rudder lock that manifested itself once the P-47D-25-RE and subsequent models reached operational squadrons. During violent manoeuvres it was possible for a pilot to get the rudder on full lock and be unable to straighten it out again. This was due to the turbulent wake from the bubble canopy with lack of fuselage spine to smooth the air flow. A forward extension to the fin helped to rectify the deficiency in keel area although both factory installations and modification kits did not reach operational squadrons until late in 1944 and early 1945.

Improvements for the P-47 were also developed by U.S.A.A.F. agencies and covered a wide field ranging from weapons down to actual structural problems.

The rocket projectile installation is a typical example. The A.A.F.'s Ordnance Department began experiments with rockets in steel tube launchers during 1942 and though reasonably successful the weight of the assemblies was undesirably high. The weapons were intended for most fighter types but due to its excellent stability and strength the P-47 became the favoured vehicle.

In December 1943 Wright Field experimented with British railed launchers, fitting two under each wing of P-47D-5-RE, 42-8053. R.A.F. personnel supervised the work and Wing Commander Lambert made a satisfactory report after flying the aircraft to determine if the installation effected handling characteristics.

Meanwhile, special lightweight launch tubes had been developed for the original 'Bazooka' like weapons and as this also presented much simplier initial installation it became the preferred type eventually put into production. The launch tubes were made from an inflammable plastic paper composition with quarter-inch thick walls. The two three-tube clusters loaded with projectiles weighed only 450lb. Tubes were aligned with the wing guns so that the normal cockpit sight could be used to aim both weapons.

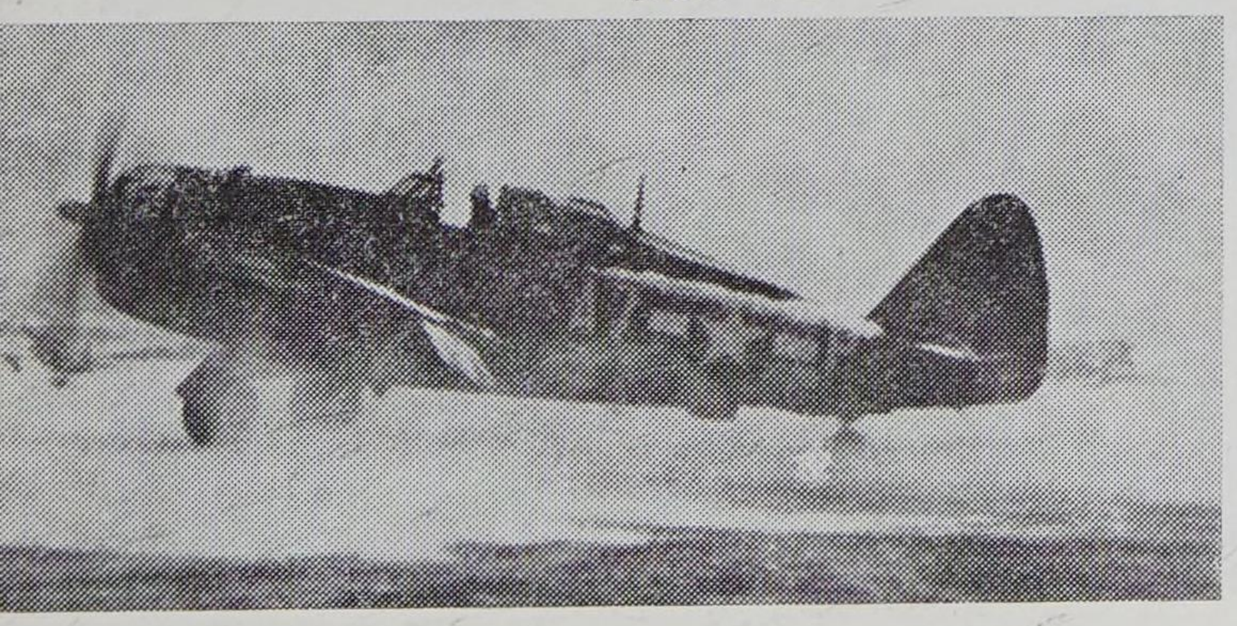
There were aerodynamic objections to the tube launchers and a later development saw five-inch, high velocity rockets requiring no rails or guides fitted directly to small wing shackles. A total of 10 rockets could be carried and factory installations commenced with the P-47D-30-RE.

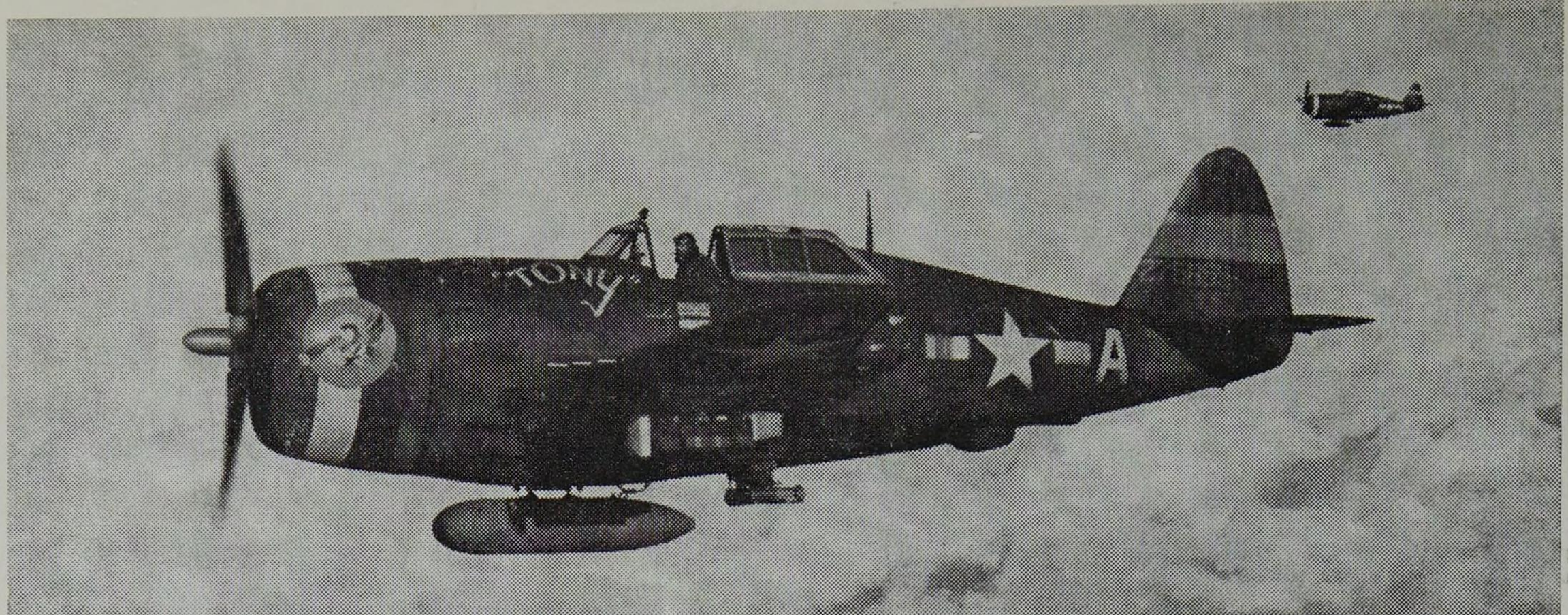
Another example of U.S.A.A.F. work on the P-47 was the automatic fuel transfer system. This embodied automatic switching from depleted tanks to full ones and overcame the risk of pilot's failure to do so manually, and the not infrequent problem of inaccurate fuel gauges. There were several known instances of pilots overlooking fuel tank changes, particularly when engaged in combat. Engine failure in such circumstances, particularly at low altitude could have disastrous consequences. Wright Field did the fitting and testing of this sytem early in March 1944, using a P-47B, 41-6038, and concluding that the system was of great value and should be installed in the Thunderbolt and other fighters.

The major steps in extracting maximum performance from the basic design were those connected with advanced power plants. Once the intial troubles with the 'B' series engines (2800-21, -59, and -63) were solved they had proved extraordinarily reliable considering the varied circumstances of their use and abuse. The 'C' series Double Wasp used in the

Snow dispersal was an unorthodox task that the P-47 fulfilled admirably. 395th Fighter Squadron kept its runways clear at Metz by taxiing in tight circles and blasting the snow away. January 1945. (Photo: U.S.A.A.F.)

368 FG





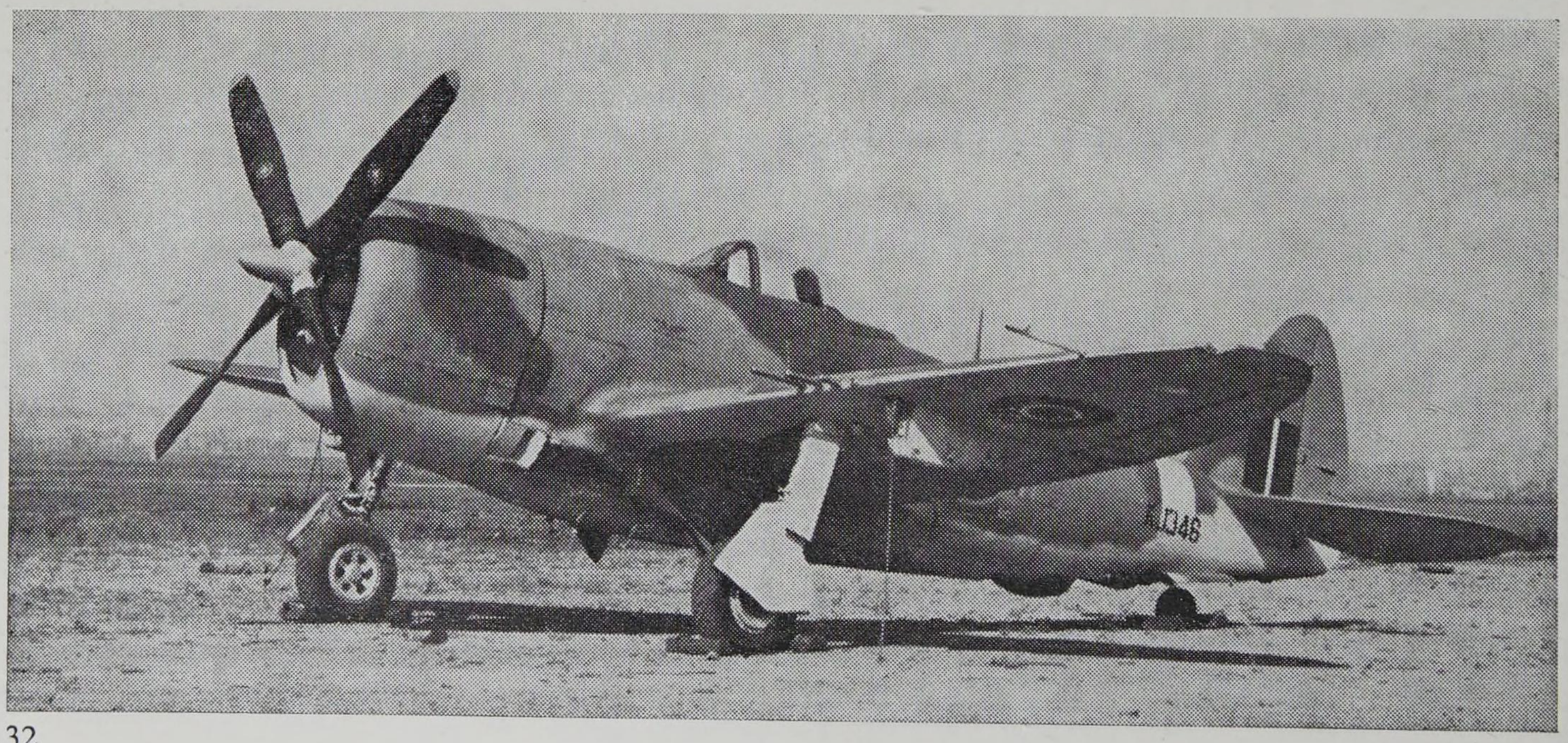
Unique P-47 unit in Europe was the 5th Emergency Rescue Squadron which patrolled the North Sea. Dinghy pack under wing, smoke markers under fuselage can be seen in this photograph. (Photo: U.S.A.F.)

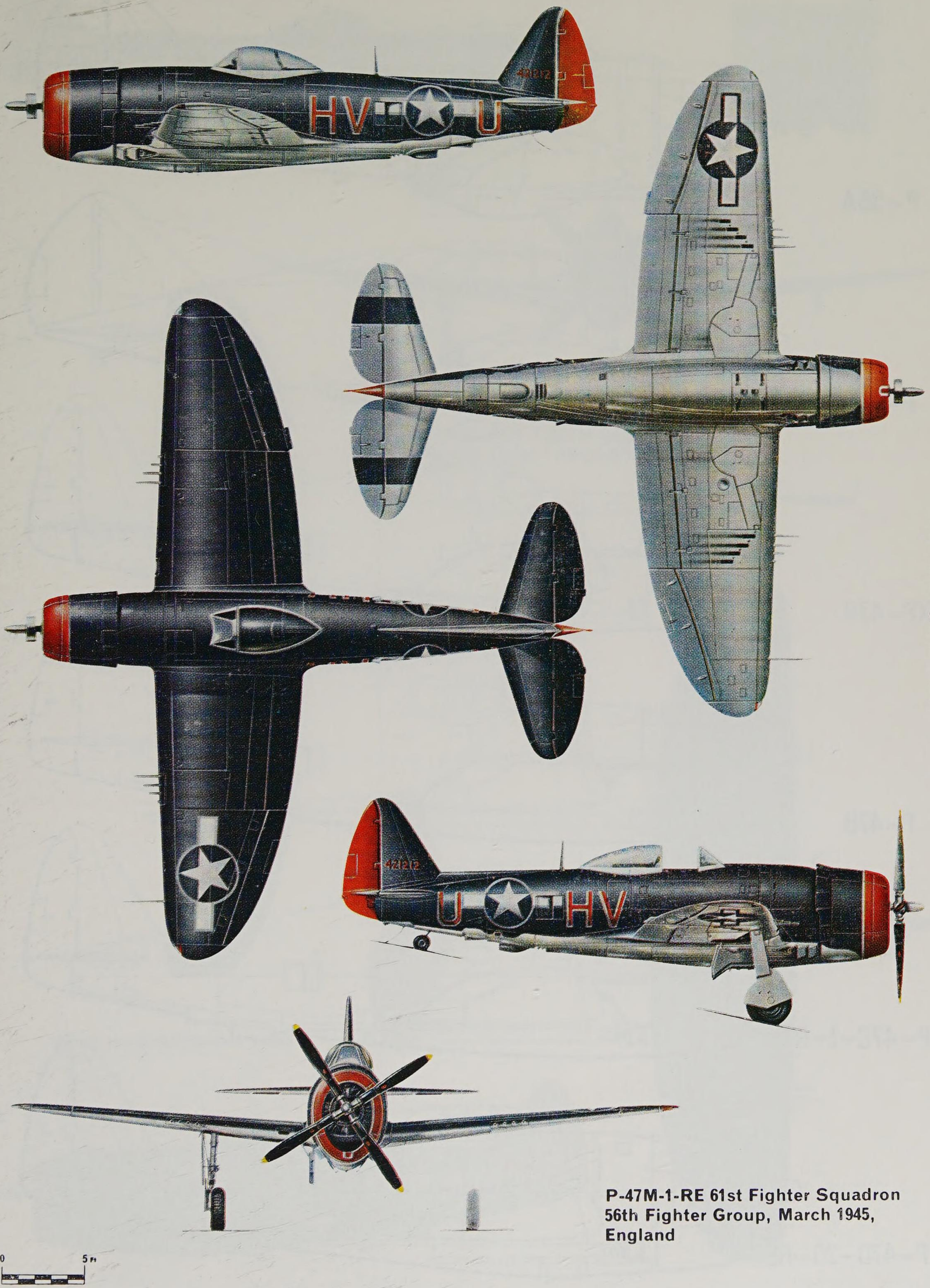
XP-47J was, therefore, a logical step in bettering the performance of production Thunderbolts. Trials were carried out with a 'C' in XP-47L and during the spring of 1944 four P-47D-27-REs were fitted with these engines; three as YP-47Ms, while the fourth eventually emerged as XP-47N. The former were basically test beds for speedy evaluation of the engine and associated components in the normal P-47 fuselage. A more powerful turbo supercharger and a number of automatic devices for this and engine controls were installed. A General Electric Unilever control system to automatically correlate turbo, boost and propeller was also tested but proved unsatisfactory at this stage of development. The 2,800h.p. engine, however, gave the YP-47Ms top speeds 50m.p.h. in excess of the D models.

The XP-47N received a redesigned wing initially tested on the re-worked XP-47K. It embodied internal fuel cells and was of greater span with squared tips. This model was aimed at overcoming the old problem of endurance, particularly in view of the long distances involved in Pacific theatre operations. XP-47N was flown by Wright Field test pilot, Captain R. B. Johnston, between August 1 and 6, 1944. He reported: 'The airplane handles easily considering its weight and was pleasant to fly. All control forces are light. At 400m.p.h. IAS the aileron loads were fairly heavy but not objectionable. The rate of roll seems as good, if not better, than on previous P-47 models. The airplane does not mush as much in tight turns as before. The turning radius appears to be improved over previous P-47 airplanes.'

On the showing of XP-47N it was expected that this model would eventually supersede the 'D' on both Farmingdale and Evansville lines. Although the first P-47N-1-RE was completed on September 16, 1944 production was some weeks getting into full stride and in the interim it was decided to use available R-2800-57s ('C' series) in the manufacture of a small number of P-47M models. The war in Europe was far from over and though the P-47s role there was now primarily one of ground attack, one escort unit clung lovingly to its Thunderbolts. To meet their requirement for speed to match the faster enemy types, the P-47M was put into production. The last 130 P-47D-30-REs on the Farmingdale line being completed as P-47M-1-REs during October/November 1944 and despatched to the United Kingdom.

R.A.F. Thunderbolt II checked out at Farmingdale (Photo: Hal Martin)





P-47M-1-RE 61st Fighter Squadron 56th Fighter Group, March 1945, England

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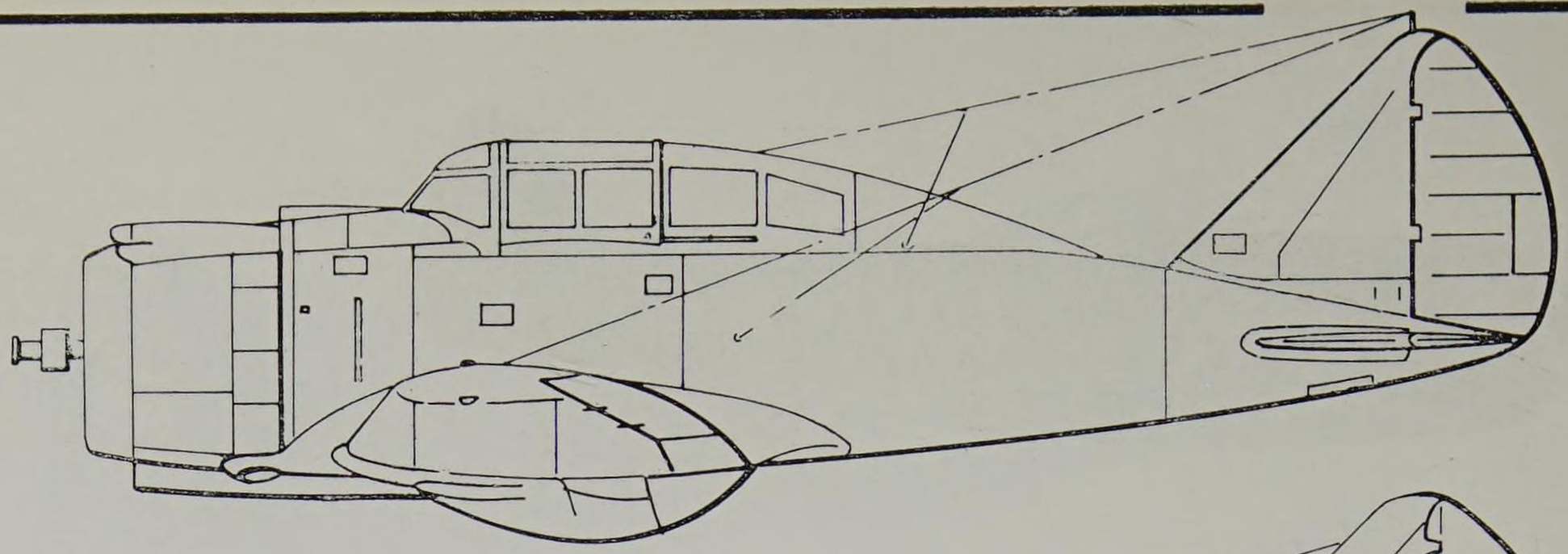
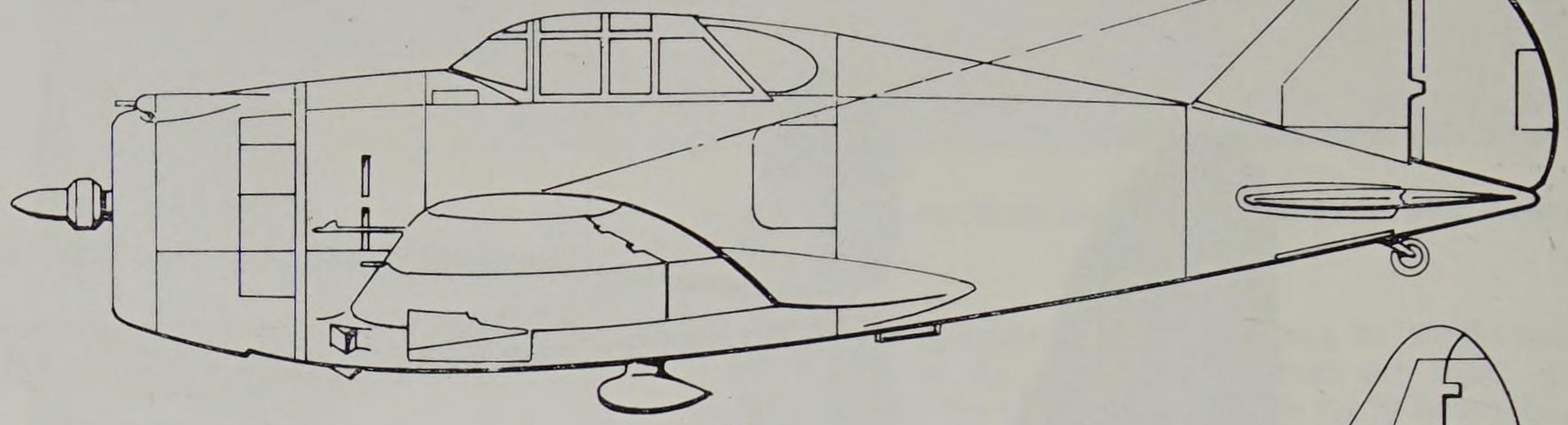
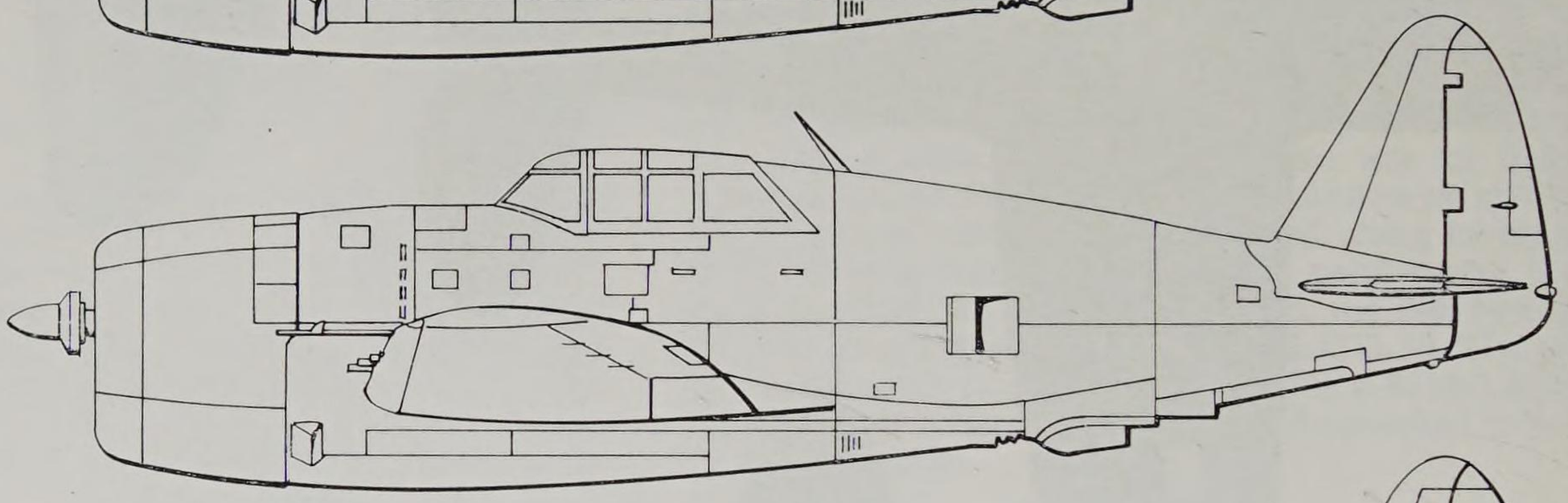
P–35A



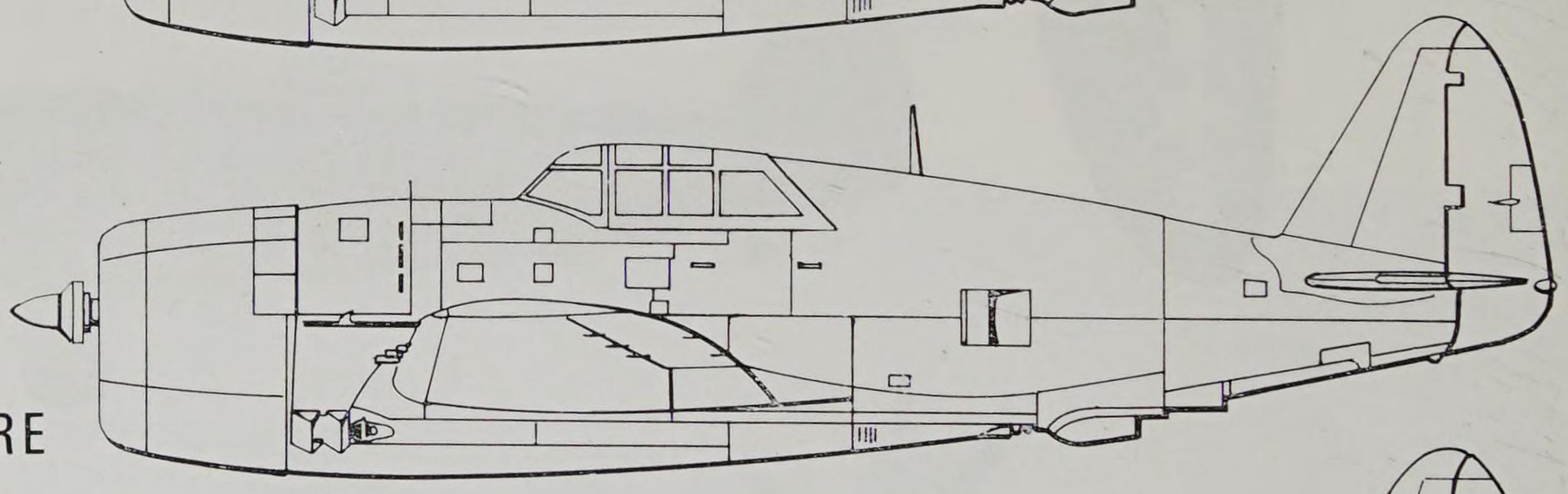
P–43



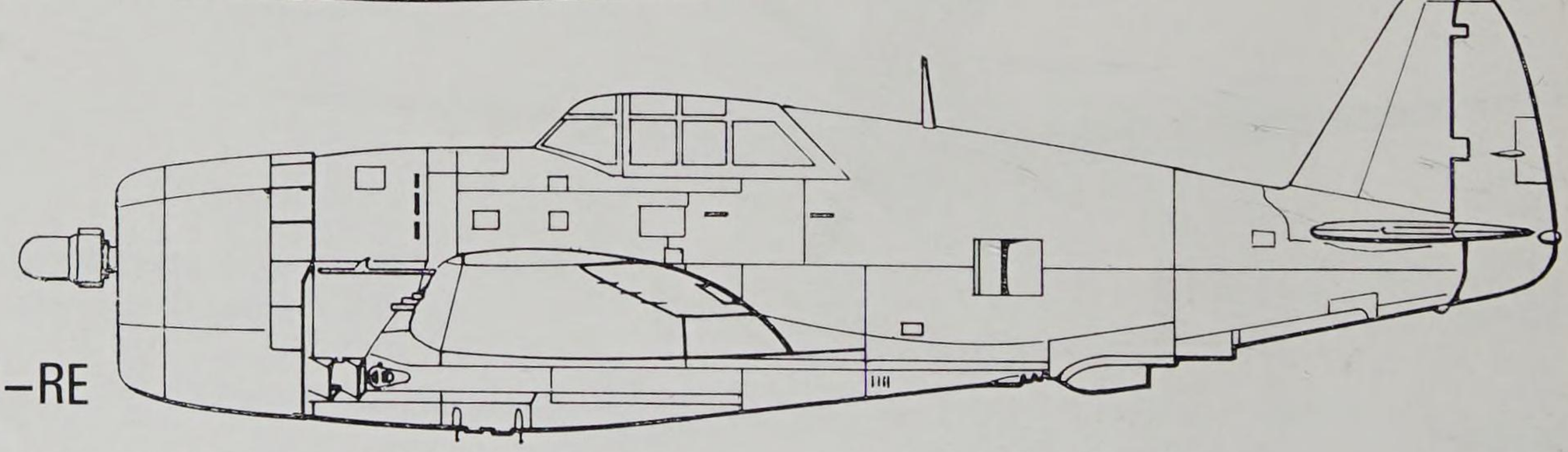
XP–47B



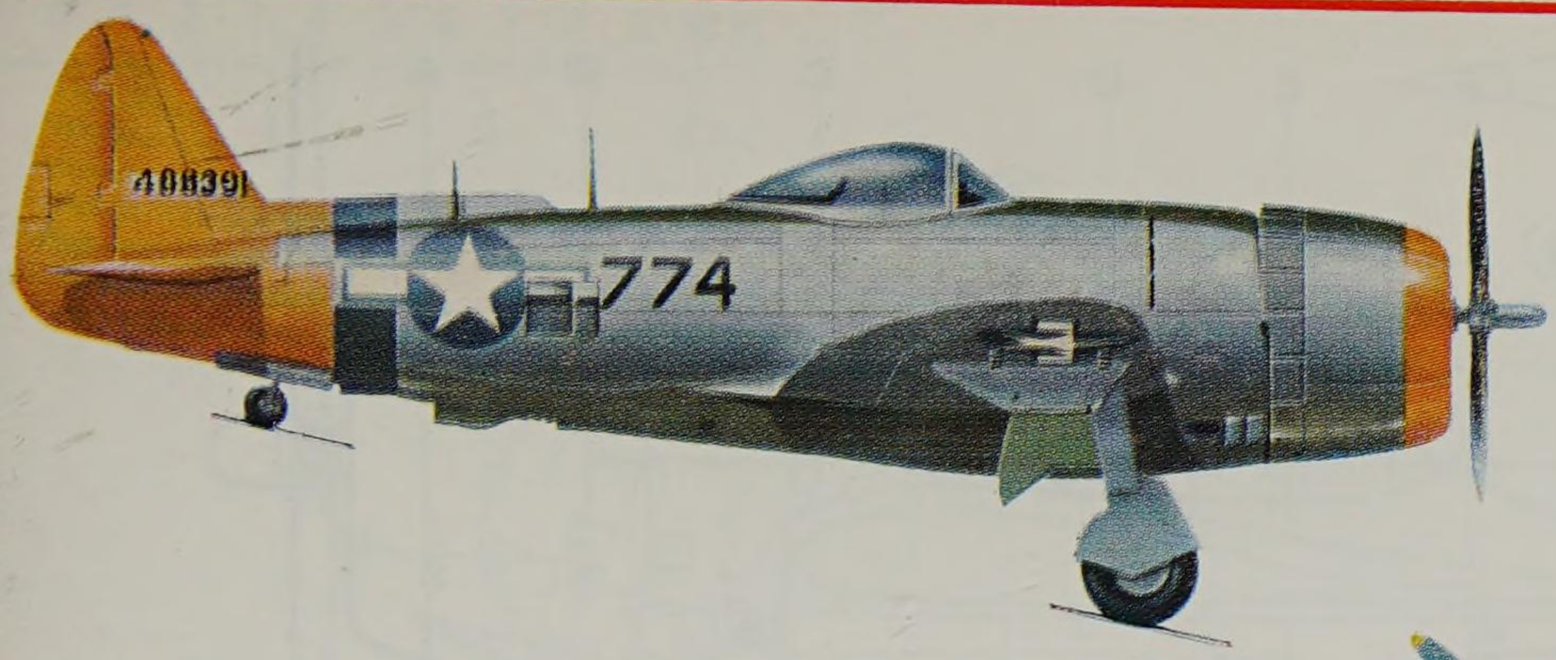
P–47B

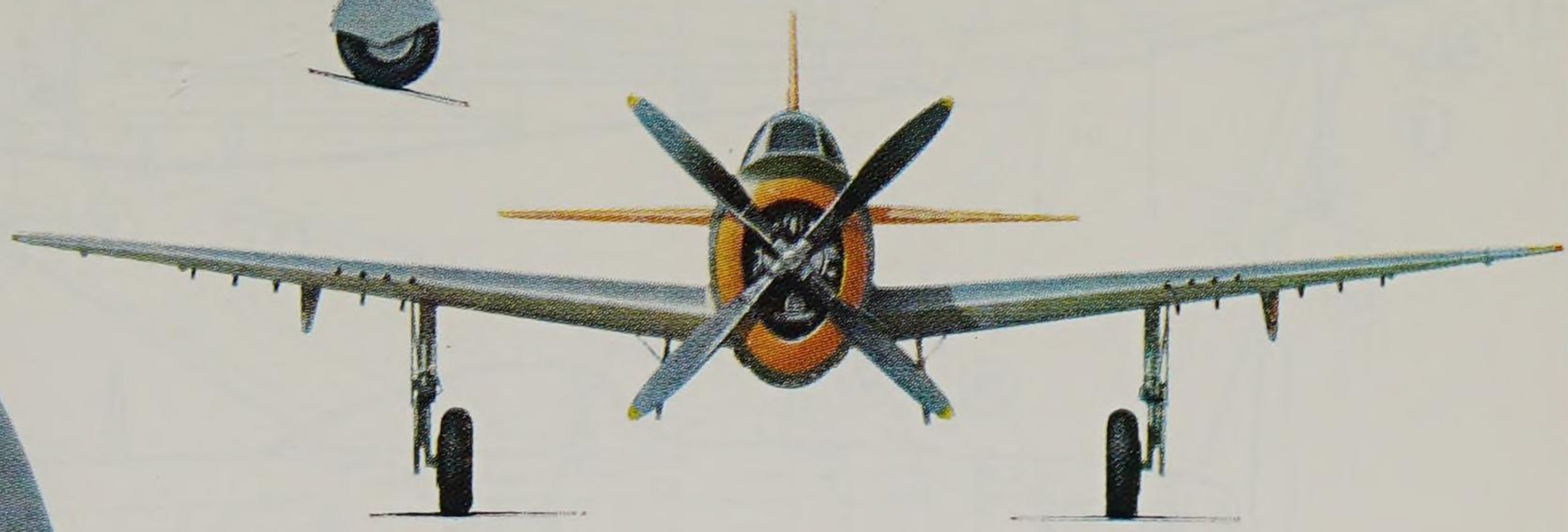


P–47C–1–RE

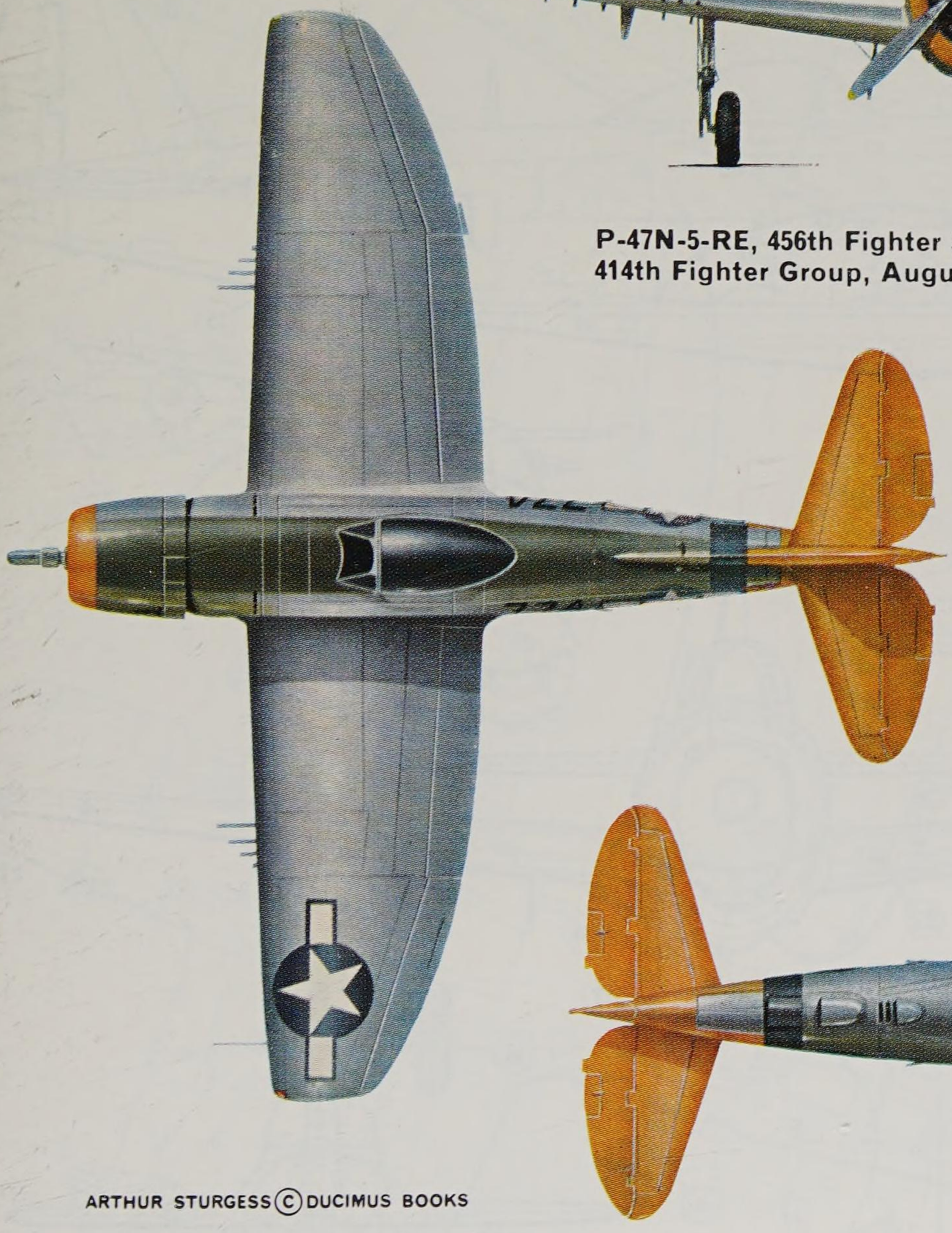


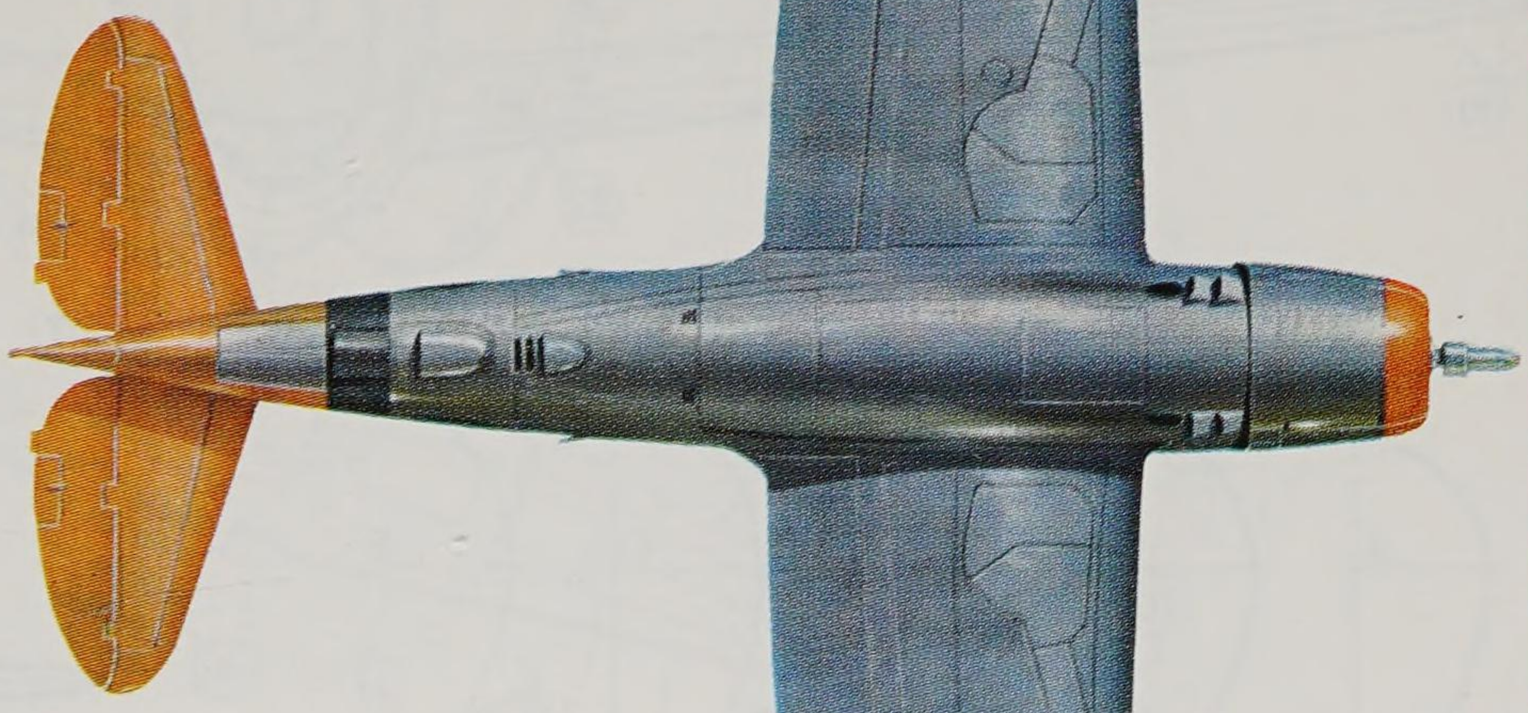
P–47D–20–RE



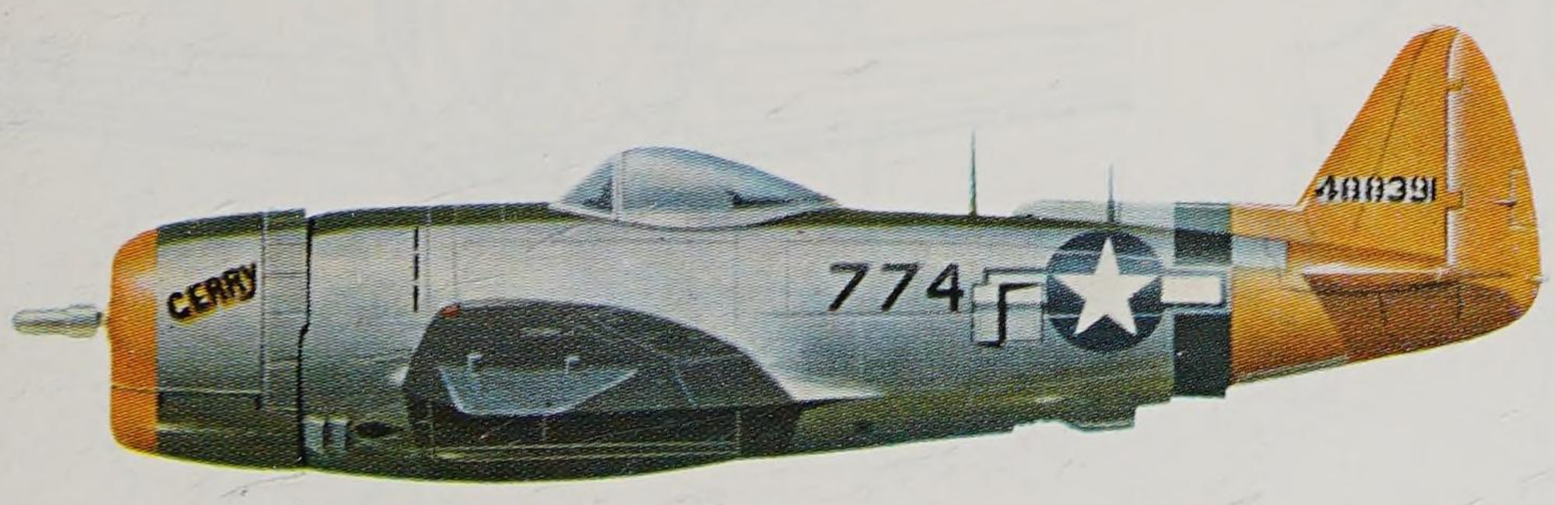


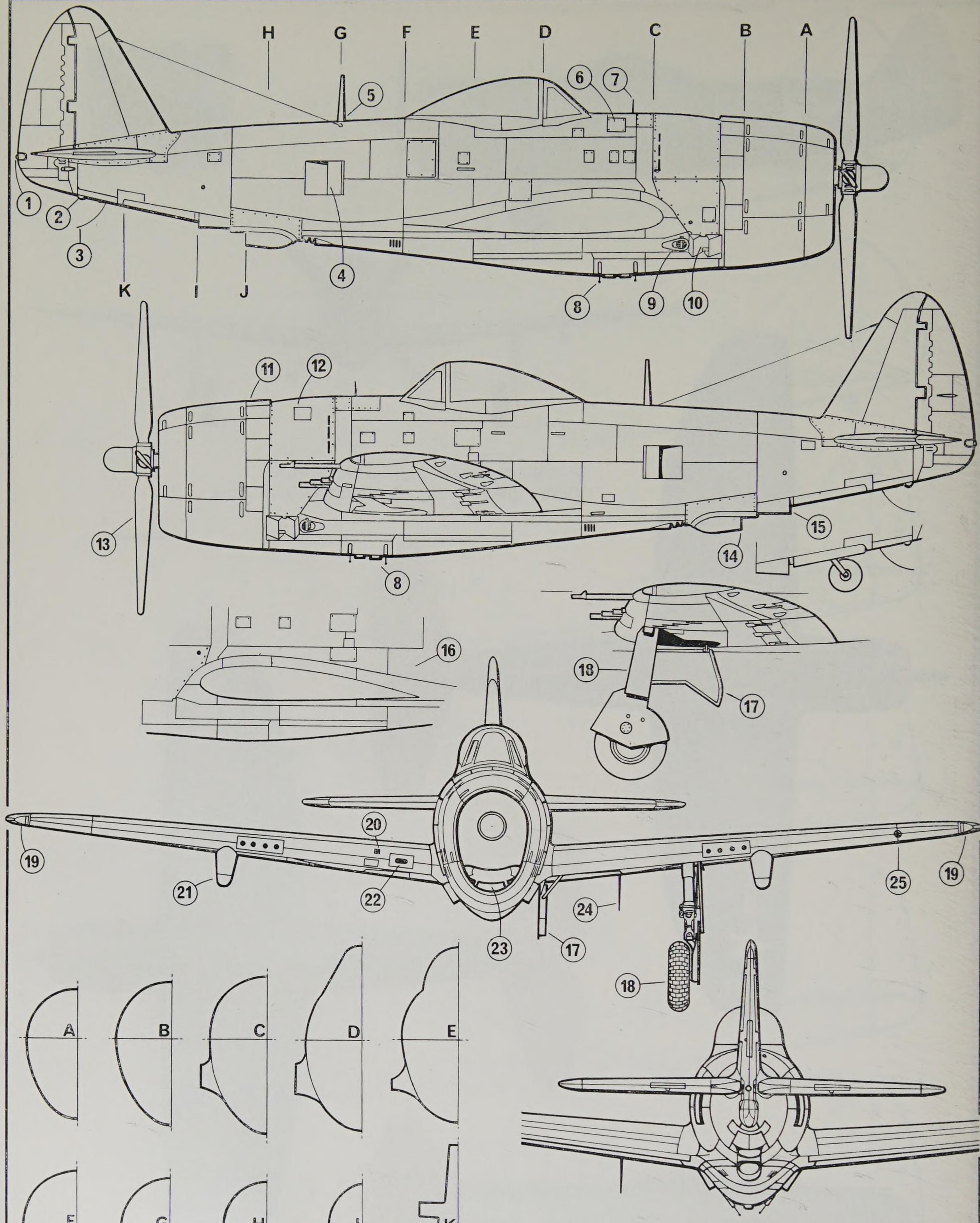
P-47N-5-RE, 456th Fighter Squadron,
414th Fighter Group, August 1945, Iwo Jima





ARTHUR STURGESS © DUCIMUS BOOKS





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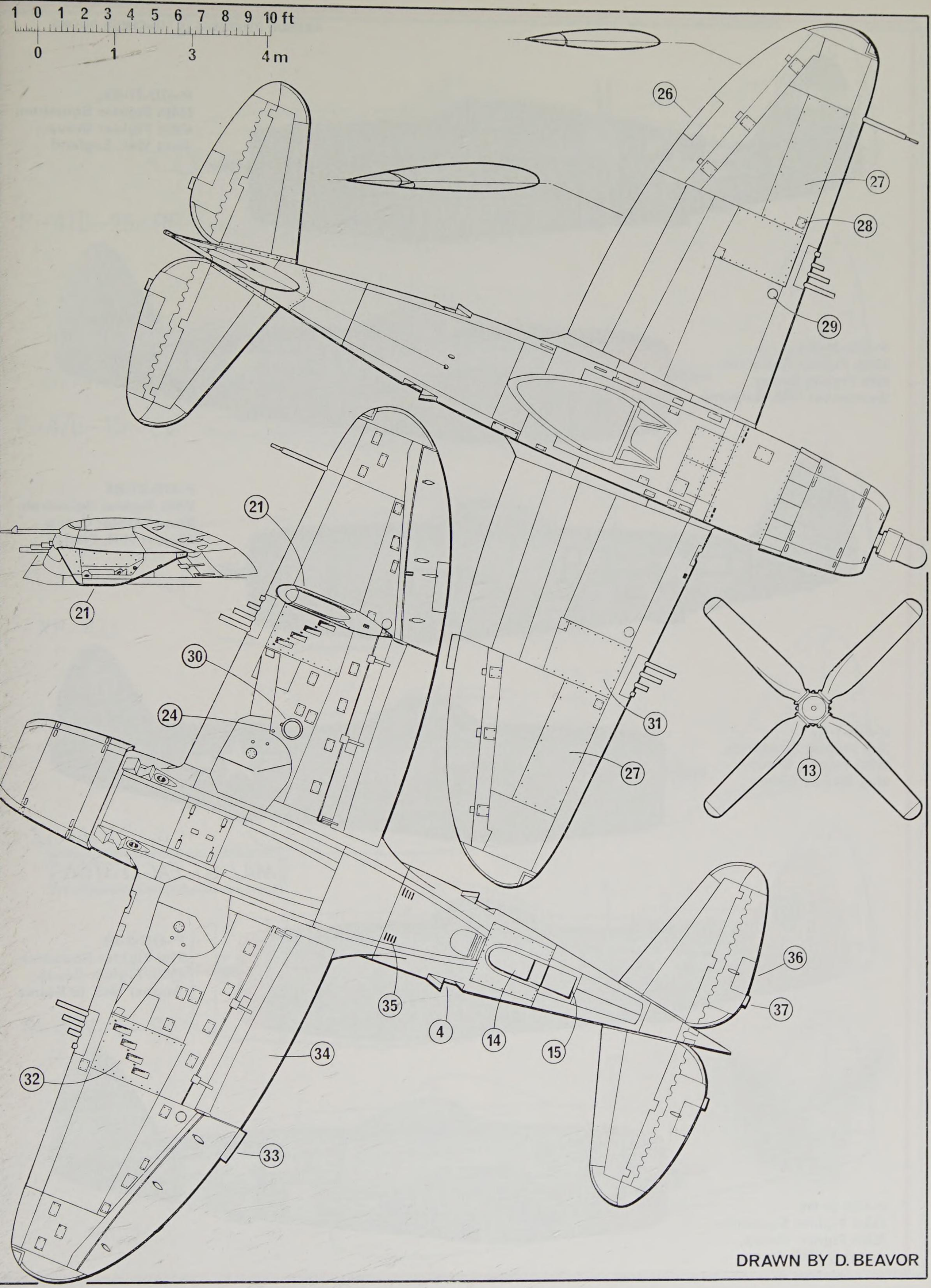

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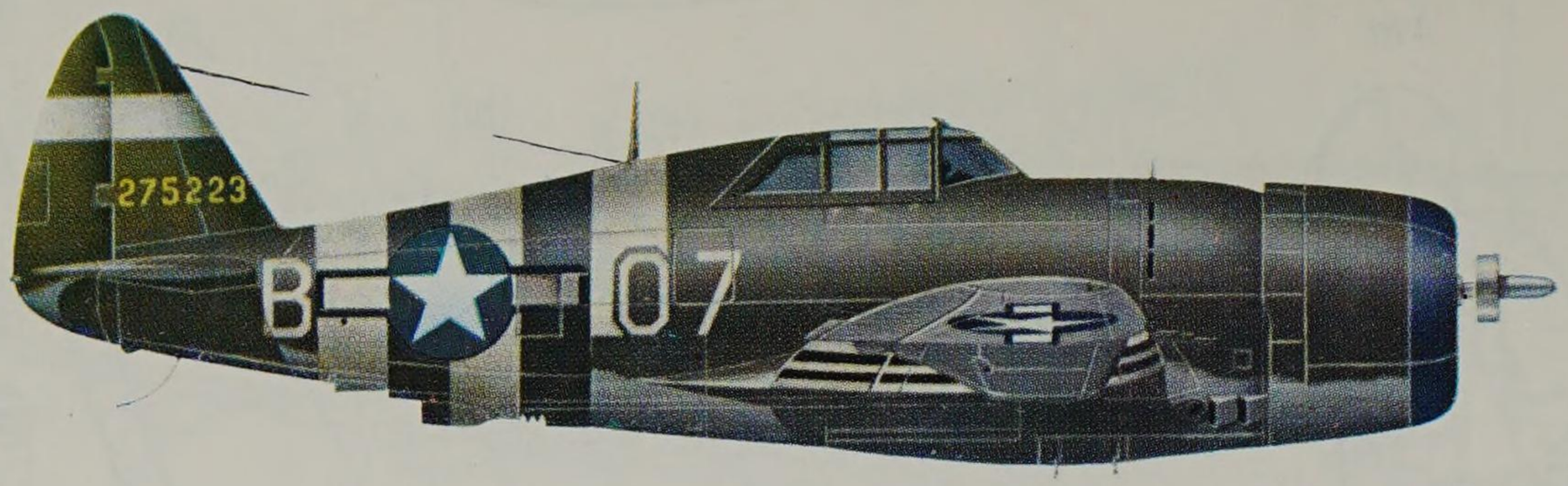
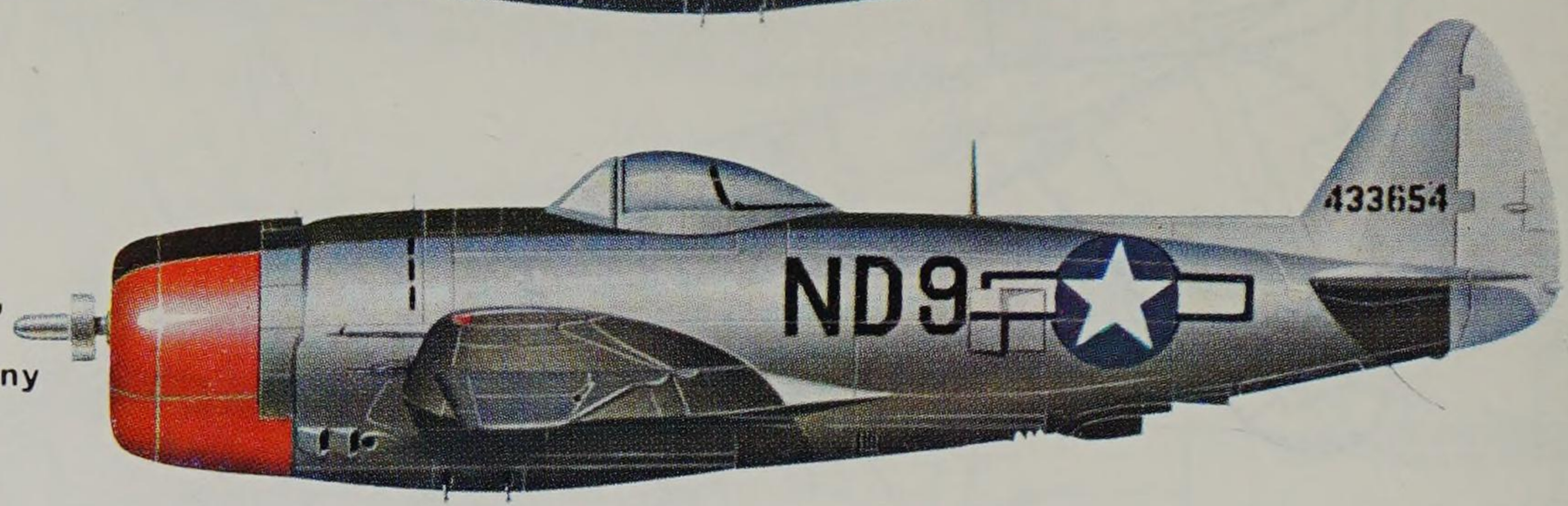
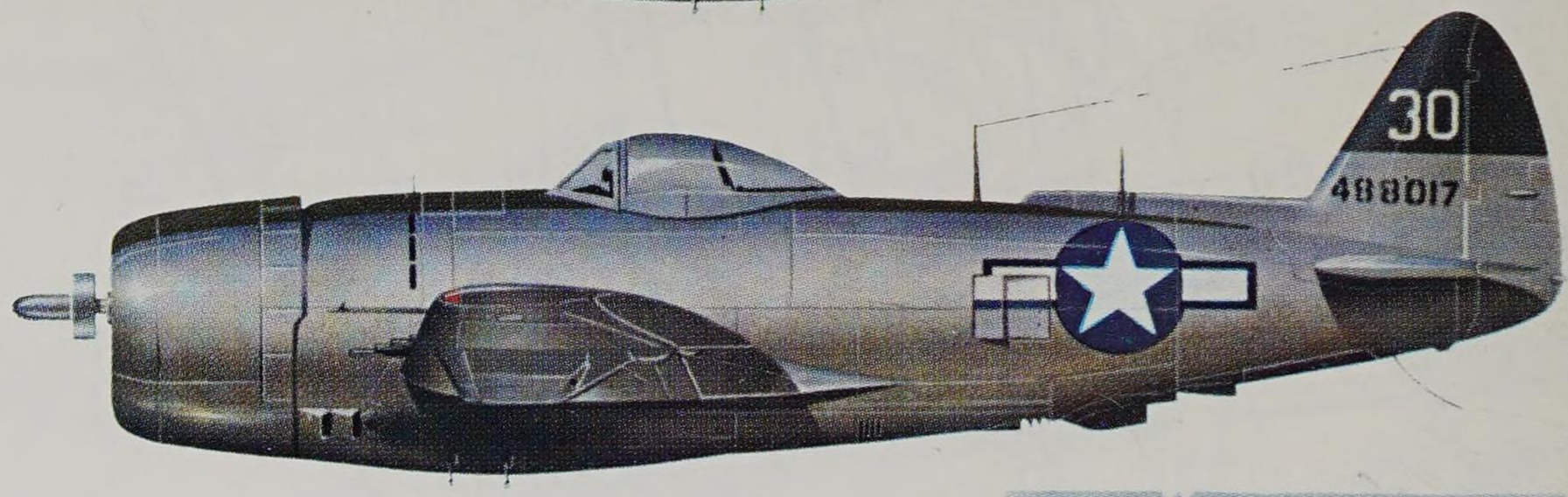


P-47D-11-RE,
514th Fighter Squadron,
406th Fighter Group,
June 1944, England



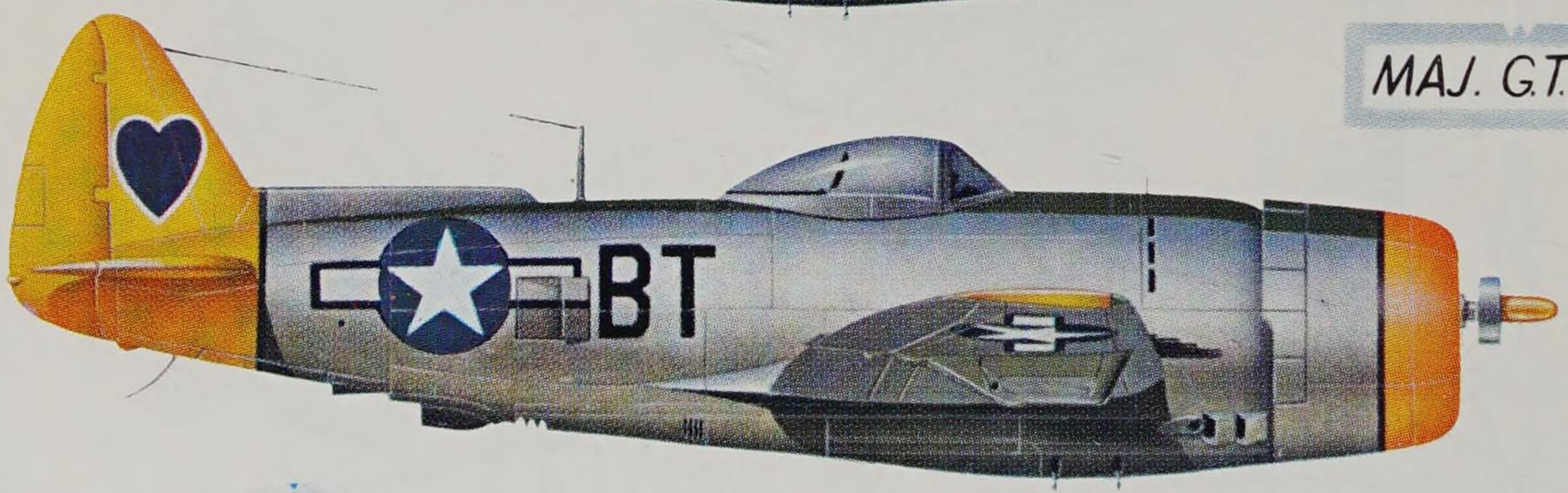
P-47D-30-RA
527th Fighter Squadron,
86th Fighter Group,
September 1948, Germany

P-47D-27-RE
378th Fighter Squadron,
362nd Fighter Group,
August 1944, France

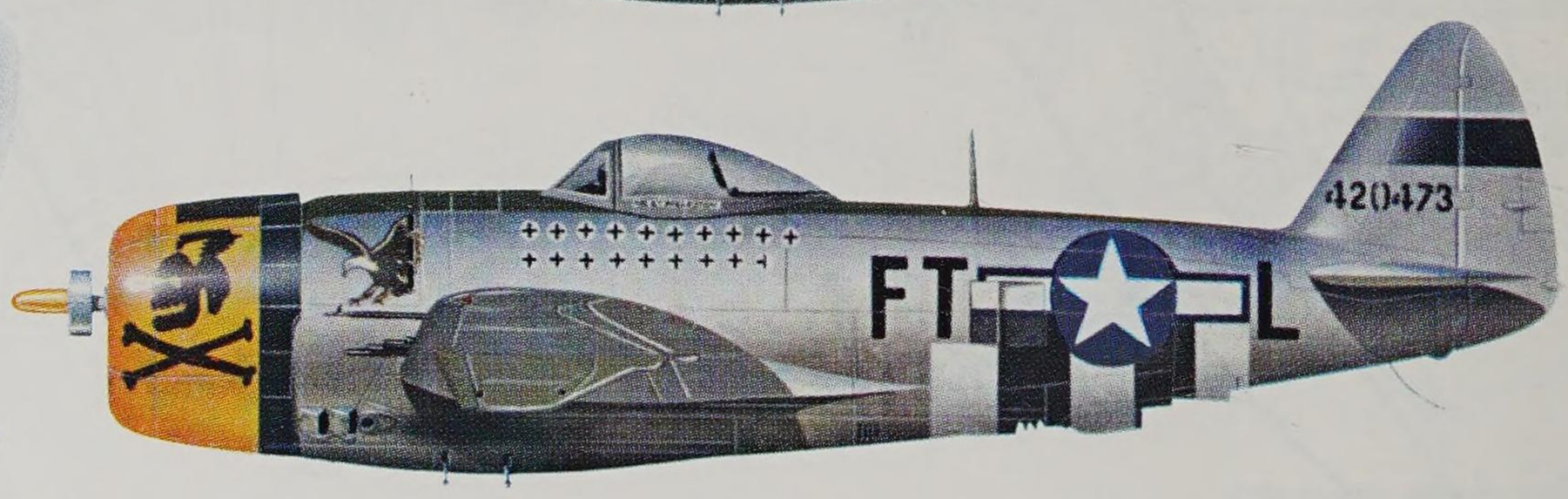


P-47N-1-RE
73rd Fighter Squadron,
318th Fighter Group,
May 1945, Ie Shima

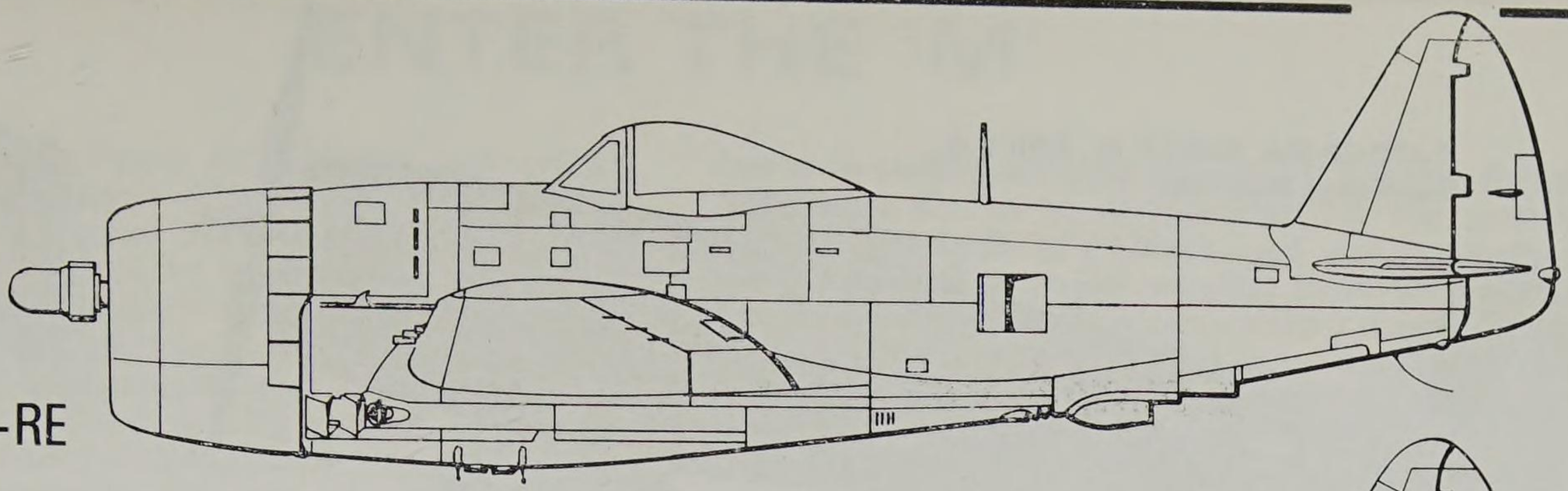
MAJ. G.T. EAGLESTON



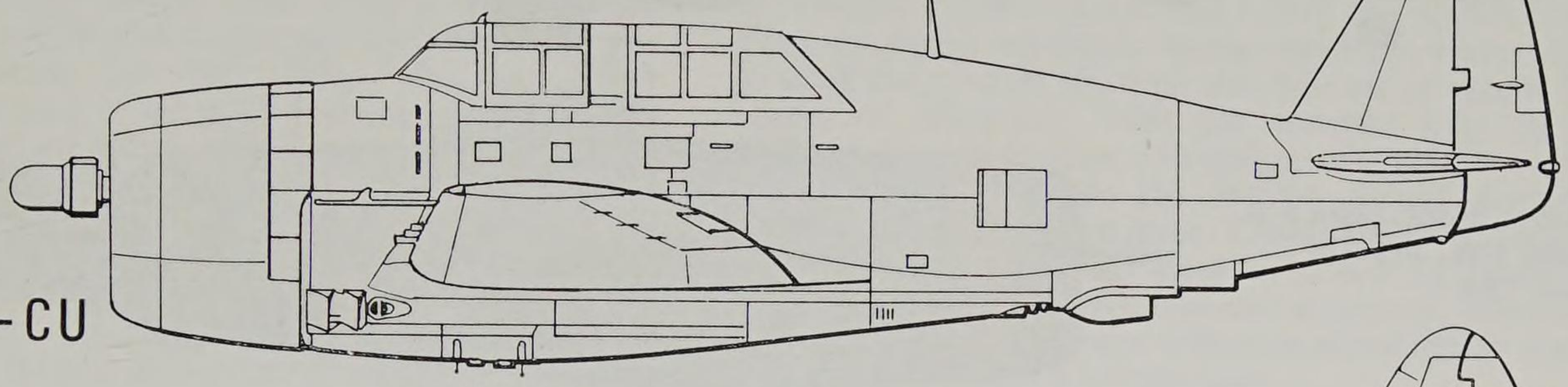
P-47N-5-RE
21st Fighter Squadron,
413th Fighter Group,
August 1945, Ie Shima



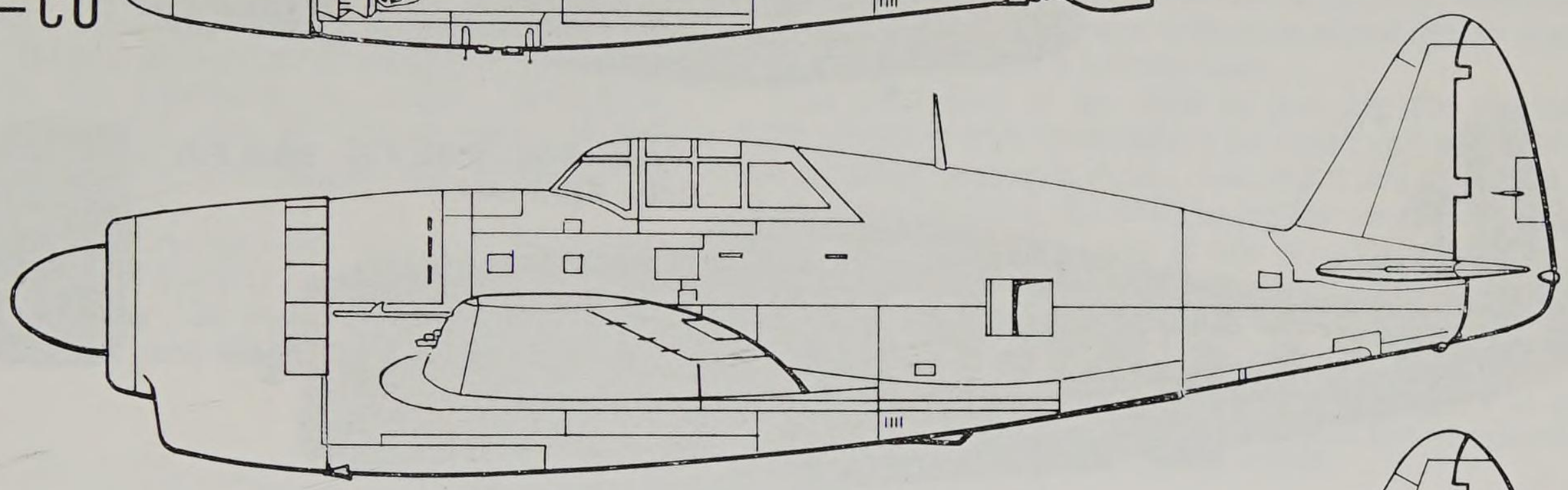
P-47D-30-RE
353rd Fighter Squadron,
354th Fighter Group,
January 1945, France



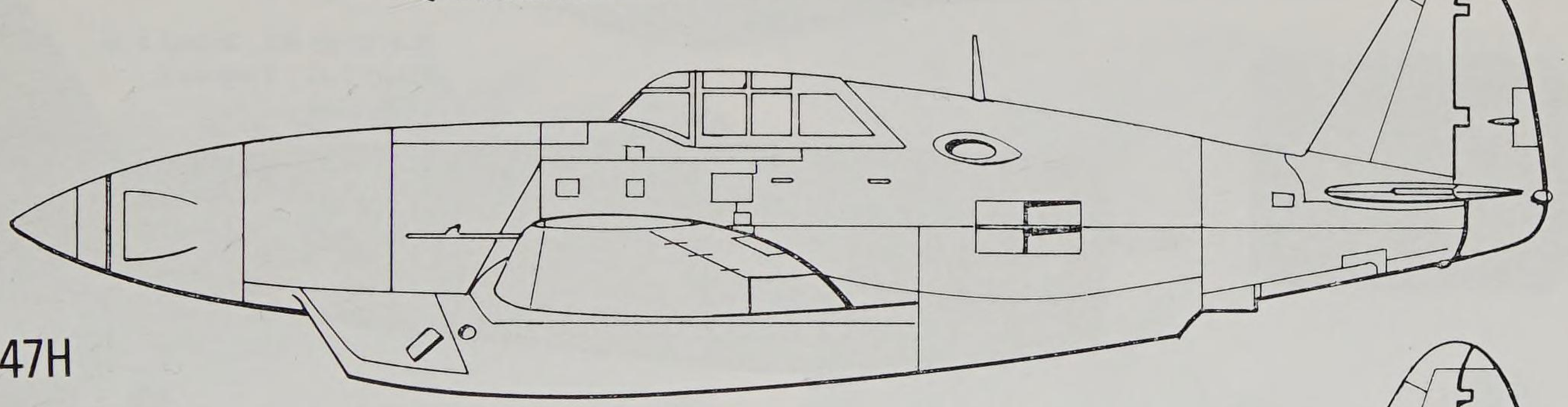
P-47D-25-RE



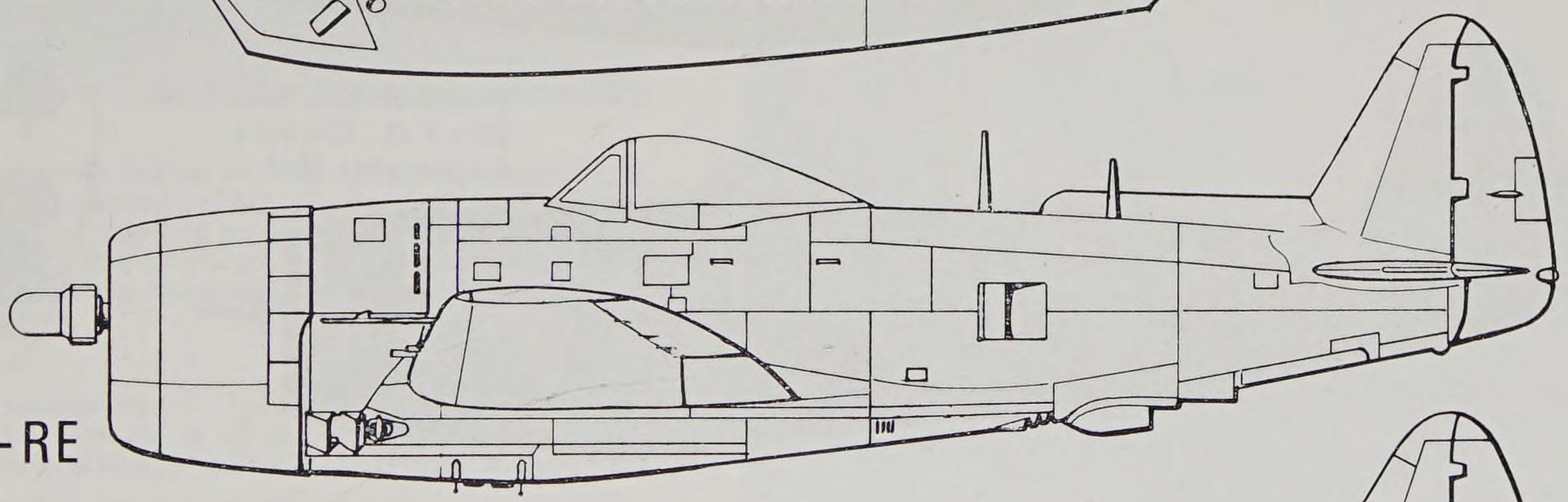
P-47G-15-CU



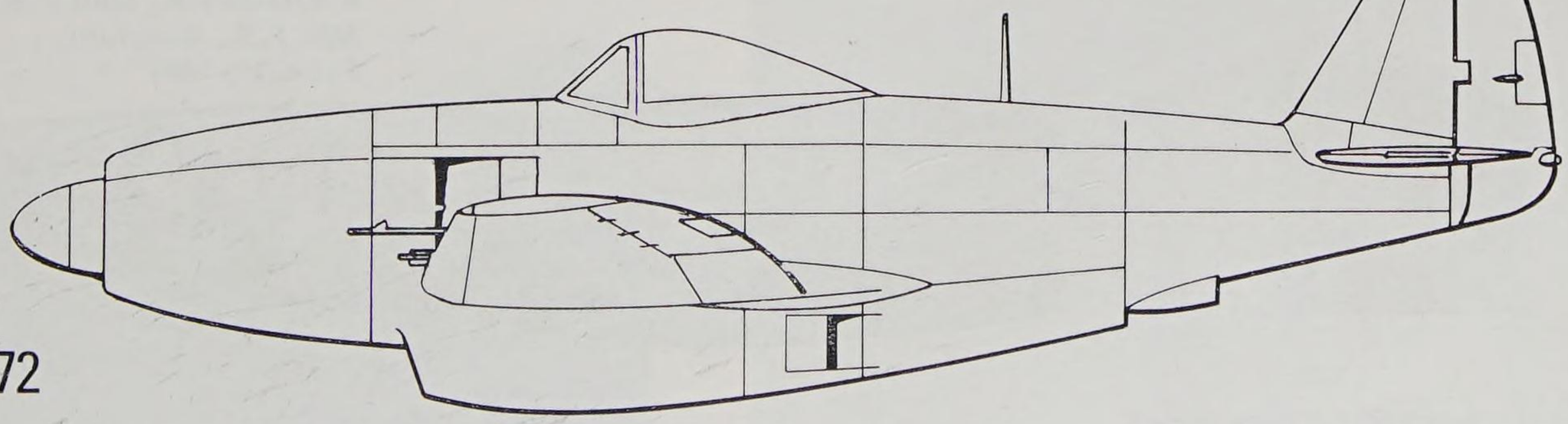
XP-47J



XP-47H

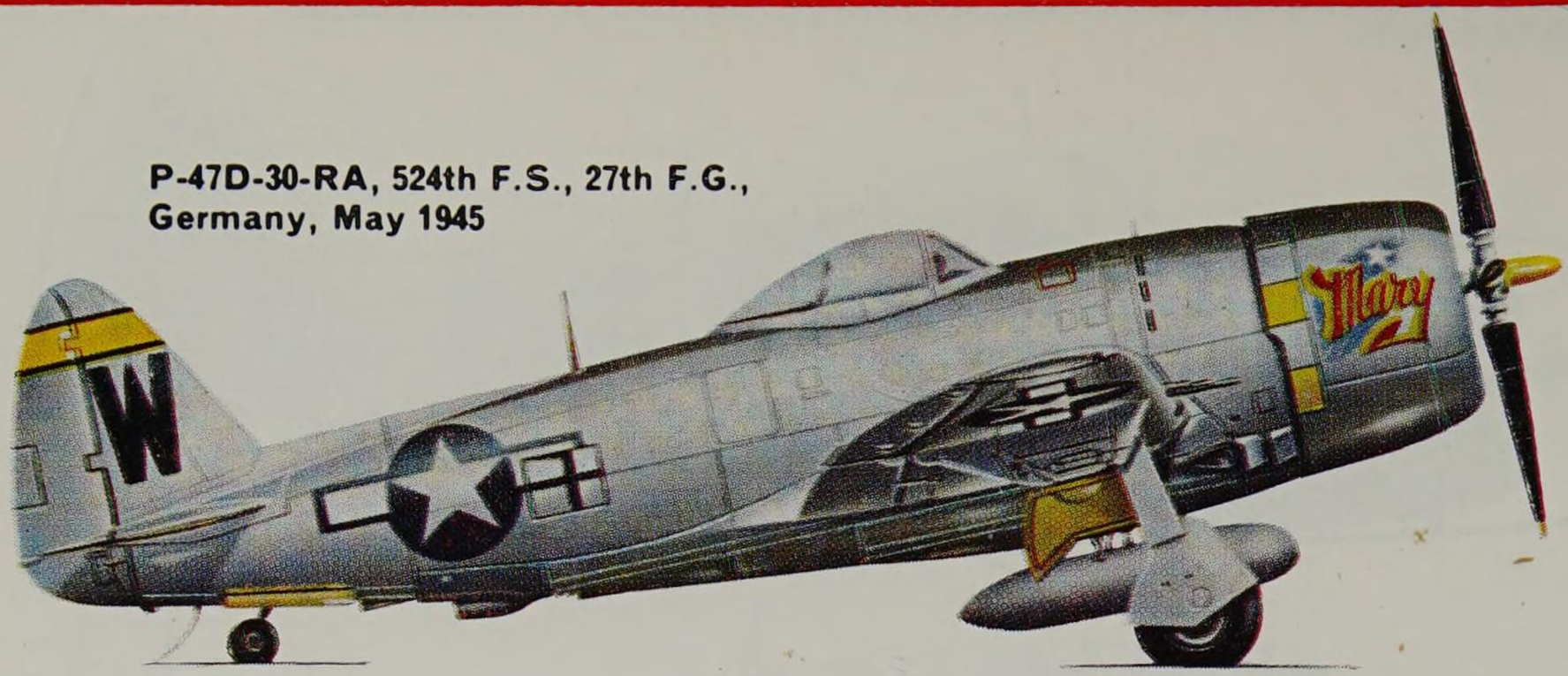


P-47N-5-RE

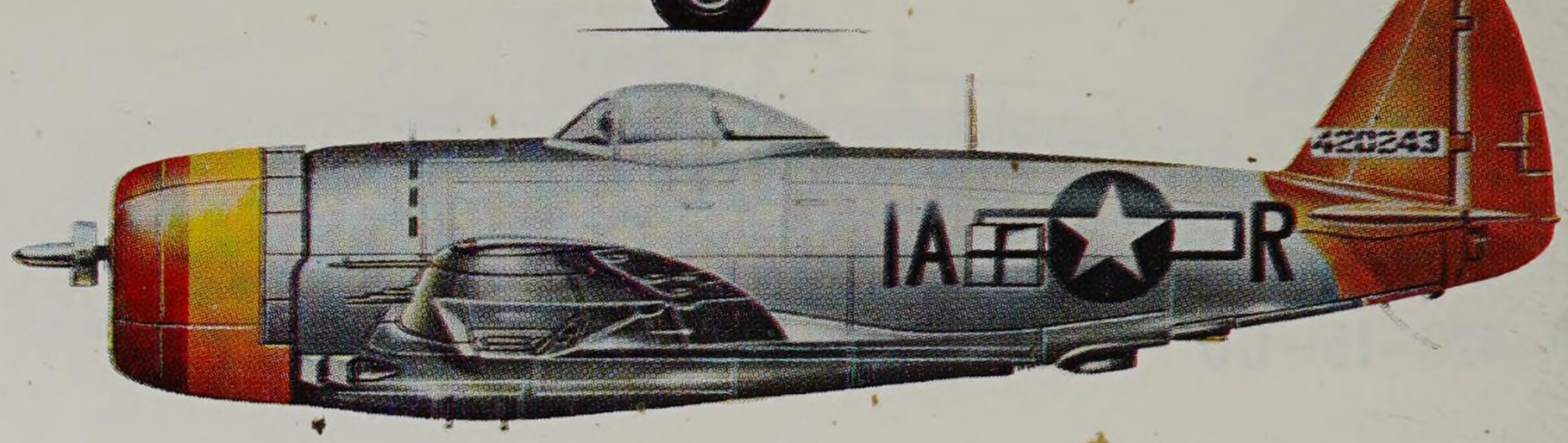


XP-72

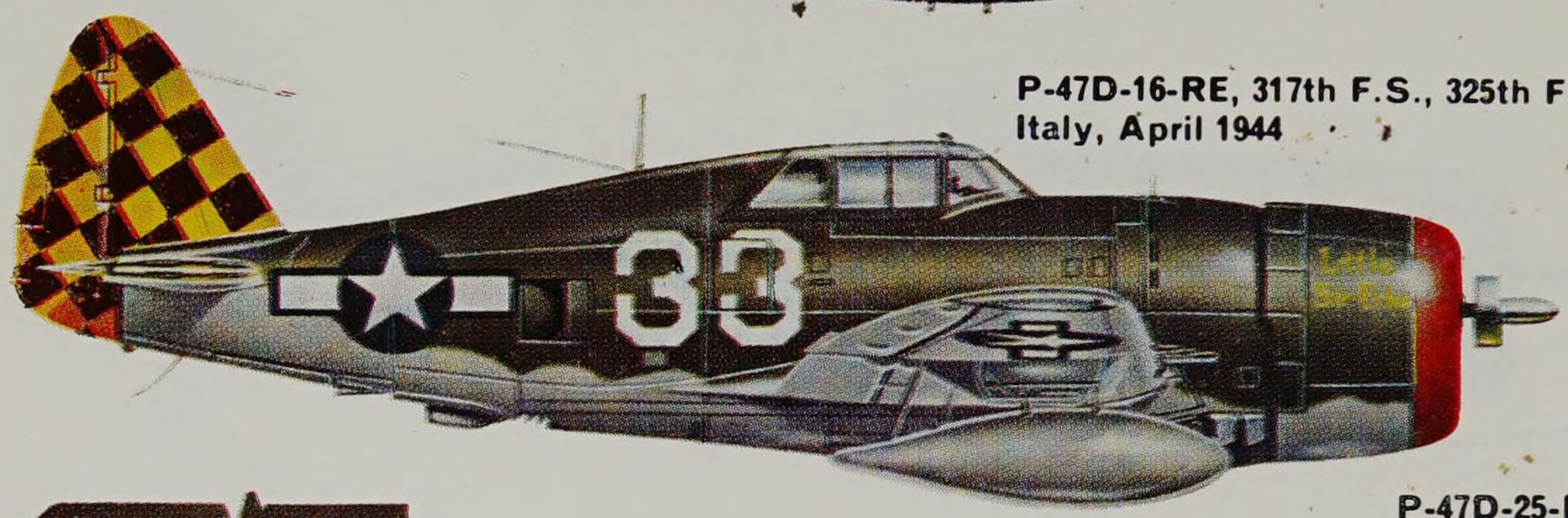
P-47D-30-RA, 524th F.S., 27th F.G., Germany, May 1945



P-47D-28-RE, 366th F.S., 358th F.G., France, Jan. 1945



P-47D-16-RE, 317th F.S., 325th F.G., Italy, April 1944



P-47D-25-RE, 352nd F.S., 353rd F.G., England, July 1944

P-47D-28-RA, 66th F.S., 57th F.G., Corsica, September 1944

P-47D-26-RA, 22nd F.S., 36th F.G., Belgium, February 1945

RONALD PERCY © DUCIMUS BOOKS

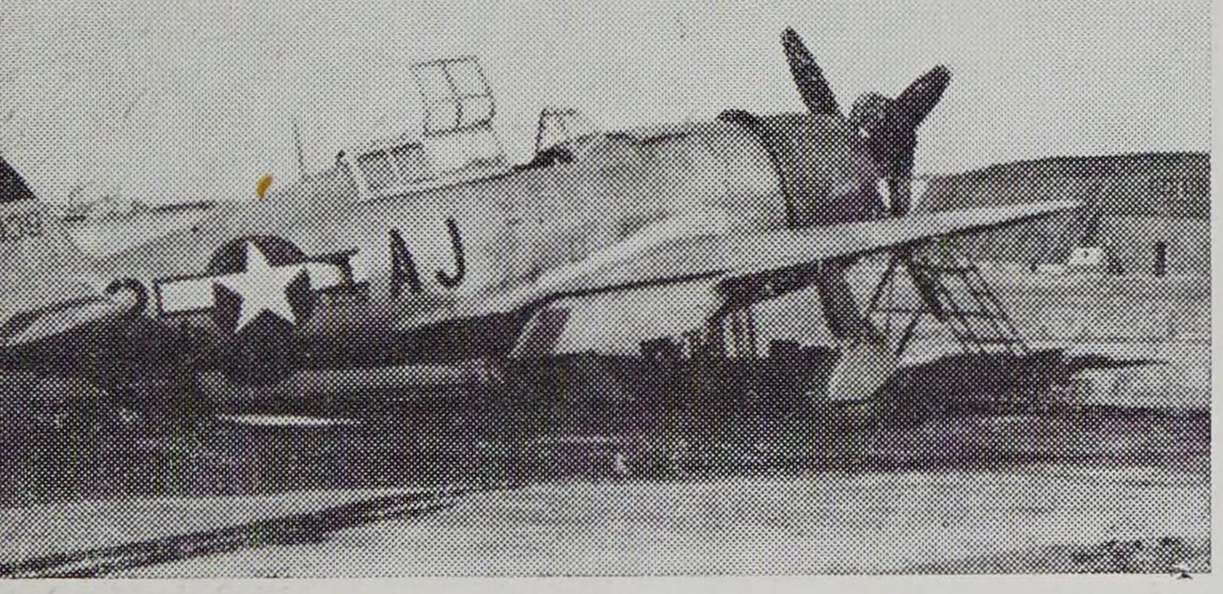
ENTER THE 'M'

THE Eighth Air Force in England had quickly reduced its complement of P-47 groups from ten in January 1944 to four by the following May. Its P-38 groups were converted to Mustangs in the months succeeding D-Day, and not until the autumn was it the turn of further P-47 units to go over to the P-51. In the meantime, the four groups used their Thunderbolts for high altitude escort and for ground attack. One day they would play shepherd to B-17s and B-24s five miles above Germany, the next day they would be down to tree-top height over France strafing and bombing tactical targets to support the land campaign. The four groups, the 56th, 78th, 353rd and 356th became something of an aerial firebrigade, utilised to meet the needs of other Allied commands as well as their own. The shining example was their commitment to neutralise light anti-aircraft gun positions in the area of the Allied airborne landings in the Netherlands during September 1944. In dull, hazy conditions which hid the enemy, the P-47s had to fly back and forth waiting to be fired at so they could establish the source and attack it. An extremely hazardous procedure which brought heavy losses, the proud 56th suffered no less than 16 P-47s missing on one mission, its highest loss of the war.

By January 1945 only the 56th Group retained the Thunderbolt and was loath to have it taken away. The saving grace was the 130 P-47Ms which were then arriving in England and promised far superior performance to the late model Ds which it was then flying. They were not to be disappointed for the aircraft reached 465m.p.h. at 32,000ft. and was faster than the Mustang. The model weighed more than the D due to the engine accessories (100lb.), supercharger (24lb.) and new propeller (8lb.) and some small alterations to the airframe. Radius using internal supply could be 300 miles on operational sorties against 325 for the late D models. With two drop tanks this range could be doubled, and therefore the increased appetite of this new model did not really have any appreciable effect on range problems facing the 56th. Naturally, to send the aircraft through the thin air at speeds in excess of 450m.p.h. with the throttle fully open demanded a prodigious 330 gallons of fuel an hour, but at cruising speeds the P-47M would average around 100 gallons per hour. Considerable improvement in endurance had been achieved by training P-47 pilots in the technique of cruise control, selecting the best settings to obtain optimum economy on long flights to and from a hostile area.

The jubilation of the 56th at keeping the aircraft with which it had established its fame and thwarting the attempt to give it P-51s, was short lived. Within a few days of putting the 47M on operations the Group realised it was once again in the position of trouble-shooter for engine malfunction. Worse, it was not just a single problem but many.

Flt/Sgt Standish-Walker climbing into a Thunderbolt I of 135 Squadron. Jungle knife and screwdriver were part of extensive 'survival kit' attached to pilot. (Photo: I.W.M.)



Most P-47 groups converted an old aircraft for two-seat flight. 42-8439 'Sunny' was inherited by 354th Fighter Group at Nordholz, Germany. Extended canopy had hinged forward section to allow passenger access. Thus modified, P-47's were restricted in manoeuvres. (Photo: Greg Moreira via R. C. Jones)

Thunderbolt II, redecorated in India for combat. White type identity bands and removal of all red markings were to save Thunderbolts from 'Jap Happy' Allied Pilots. (Photo: R. Capewell)

The first trouble manifested itself at high altitude. A pilot would soar to 30,000ft. with the Double Wasp singing sweetly but the moment he levelled out and reduced power the engine would cut out. What was more, every P-47M in the group had the same symptoms. The matter was brought to a head on January 23, 1945 when one cut out completely and would not restart, the pilot having to make a dead stick belly landing on his base at Boxted, Essex. Realising that something was radically wrong with the engines, 56th contacted the Maintenance and Technical Services at Bovingdon, the organisation specially devoted to U.S.A.A.F. operational engineering problems in Europe. At the same time, the Group reported that engine cylinder head temperatures were excessively low at all altitudes and could only be raised by high power flying.

To Cass Hough, Maintenance and Technical Services deputy director, these troubles sounded very similar to those experienced with the first P-47Cs to arrive in England during January 1943. Consequently, he advised the 56th to look for cracked high tension leads from the magneto to distributor on the belly-landed P-47M. Inspection revealed bad cracks which had obviously led to shorting out. Further cracks were discovered on other P-47M engine leads so a programme of replacement was instigated, the original plastic-covered type being removed and special neoprene-covered installed in its place.

Faulty Leads

Faulty ignition leads could only be part of the trouble and the high altitude cutting out led the Bovingdon engineers to suspect the correlation of throttle to turbo-supercharger regulation as the likely culprit. As mentioned previously, incorrect manipulation of the various power controls led to too high manifold boost and engine damage on early P-47s, a situation that was met by modifications and improvements to the system of inter-related controls. The correlation was established in tests at the factory but when P-47s that could reach 38,000ft. over Long Island were transferred to East Anglia they refused to go higher than 28,000ft. on most days. A difference in atmospheric conditions and temperatures. This had been corrected on the D models by making a new control cam for the turbo-regulator linkage, and experiments along this line were conducted with the P-47M. A programme of tinkering and testing was conducted during the last few days of January 1945 and the first week of February on Bovingdon's own P-47M, 44-21113, acquired straight from the fitting-out depot at Burtonwood. The suspicion was well founded and it was discovered that correlation was incorrect. Reworking the cam and other adjustments allowed smooth engine operation at all altitudes with desirable power settings.

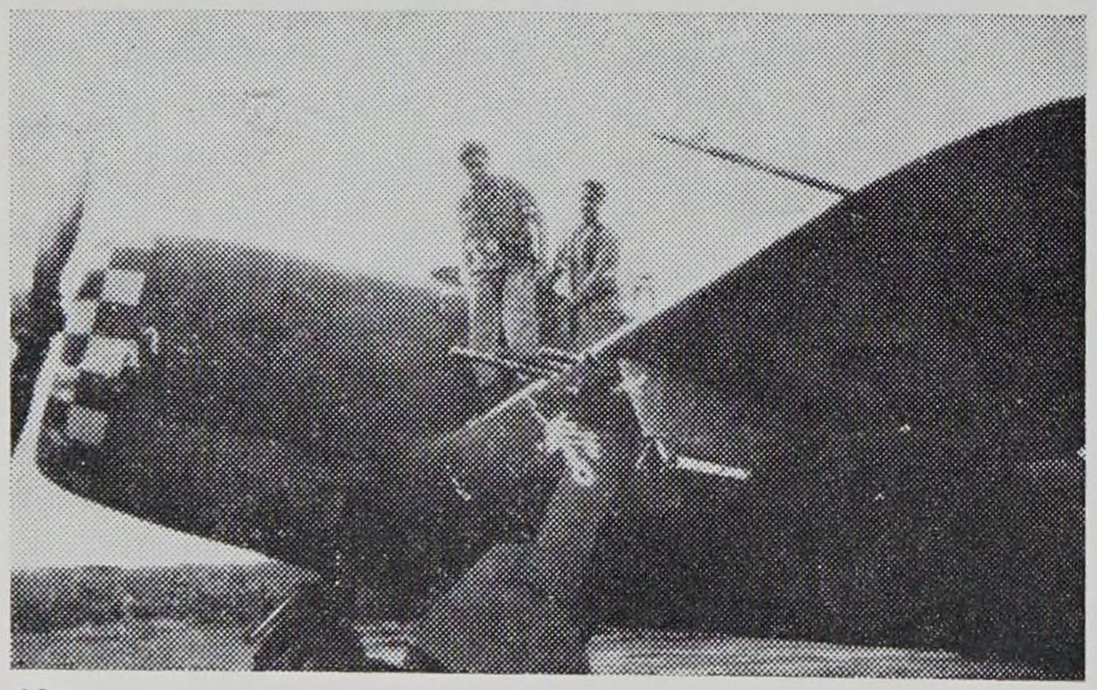
To raise cylinder head temperatures, lagged push-rod covers were installed on the R-2800-57, a procedure that had helped cure the problem on P-47C's R-2800-21 engines. Little if any benefit was derived from this so a special metal baffle was made to restrict airflow through the cowl outlet flaps. This proved satisfactory in pushing up temperatures and also went some way to equalising those of individual cylinders. Non-uniform cylinder head temperatures had been a problem before due to the streamlined shape of the P-47s cowling affecting air currents over different parts of the engine.

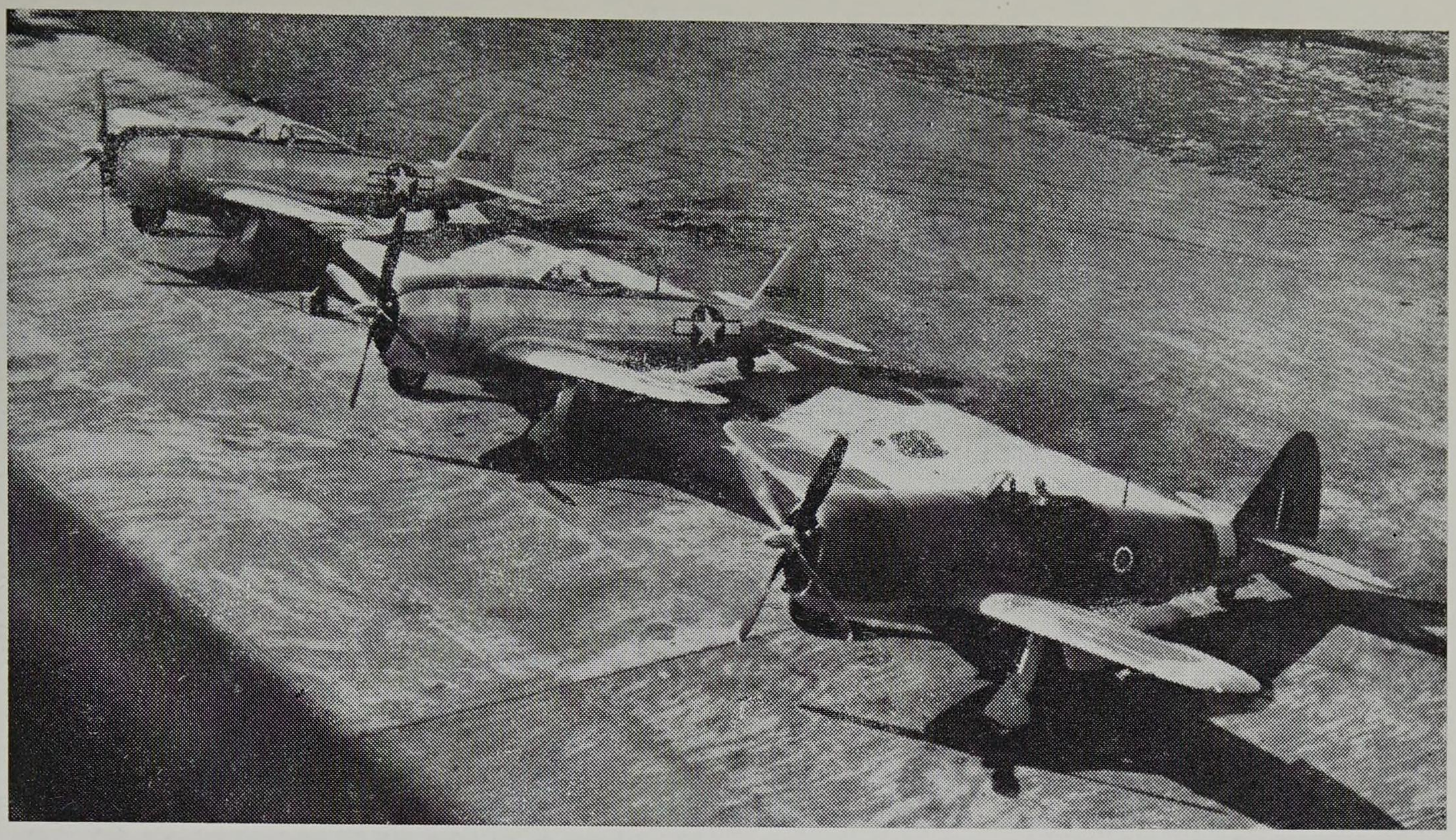
While this test work was in progress, the 56th Group experienced a few cases of propeller malfunction. The feathering circuit was shorted out by a broken spring. Bovingdon quickly found a remedy for this and hoped they had cleared the P-47M for action. This was not to be for P-47M's continued to have engine failure; this time internal seizures which caused a number of crash landings and fatalities. Now, was it burnt pistons, a legacy of the former troubles or something additional? Throughout February and into March the R-2800-57 stubbornly refused to behave; corrosion was discovered and eventually the situation was only resolved by changing every P-47M engine at Boxted—nearly 80.

A Thunderbolt I (P-47D-22-RE) of ~~114~~ 134 Squadron, April 1945. Photo: R. Capewell)

Pilots of 135 Squadron about to leave on an operation from Jamchar. Examining map with Gp. Capt. G. Chater are l. to r. Flt. Lt. D. McEachron, F.O. D. Houghton, Flt. Lt. J. Turton and Flt. Sgt. F. Hammond. Aircraft have 165 U.S. gal. tanks installed. (Photo: I.W.M.)

258 Squadron pilot back from a raid. Colourful red and white checkerboard cowl markings that adorned this unit's aircraft were short-lived, and replaced by official white bands. (Photo: N. Broom)





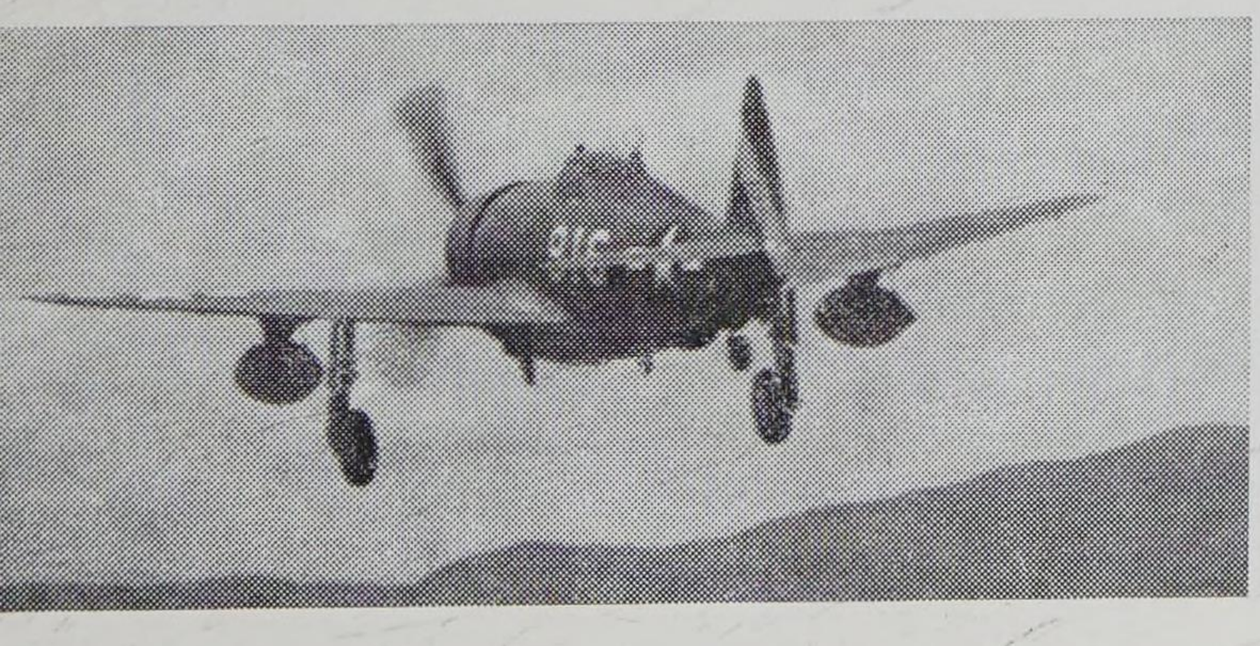
Awaiting delivery at Farmingdale P-47D-30s and Thunderbolt IIs. (Photo: Republic)

The new model did not begin full-scale operations with the 56th until April, when the D's could finally be withdrawn. In the last days of the European war the 56th did some good work with the M and on a number of occasions used its speed and diving ability to catch and shoot down Luftwaffe Me262 jets. The high performance of this Thunderbolt made it very popular with the pilots.

Typical are the views of Edward Crosthwait, who flew with the 63rd Fighter Squadron, and shot down an Me 262 at the end of March 1945: 'When the troubles were finally ironed out the "M" quickly endeared itself to pilots. Most certainly the finest combat aircraft I ever flew—and there were several, including late model P-51s. The extra power made all the difference and you were no longer conscious that you were flying the heaviest single-seater in the world.'

The 56th Fighter Group emerged from World War 2 as the highest scoring group in the Eighth Air Force with 674 enemy aircraft destroyed in air combat, and also as the highest scoring Thunderbolt group in the whole U.S.A.A.F. The 56th also provided the two top scoring fighter aces in Europe, namely, Francis Gabreski who claimed his 28th victim on July 5, 1944, and Robert Johnson who had previously been credited with 27 in the air.

91st Fighter Squadron Thunderbolt overshoots at its Chinese base. Tanks are 165 gal. type. Note D/F ring aerial. (Photo: U.S.A.F.) 81 FG



Tactical fighter pilots of the Ninth and Twelfth Air Force did not have such opportunities for destroying the enemy in the air, and the three top scorers in the Ninth, Lieutenant-Colonel Paul P. Douglas, Jr. (368 FG), Captain Edwin O. Fisher (362 FG), and Captain George McLaughlin (404 FG), had seven victories each.

Invasion Support

Twelfth Air Force Thunderbolt groups supported the Allied invasion of Southern France in the late summer of 1944 and then returned to the difficult Italian battle front. During a series of missions carried out by the 350th Fighter Group on April 24 and 25, 1945 against heavily defended airfields in Northern Italy, Lieutenant Raymond L. Knight personally destroyed at least 20 enemy aircraft by strafing. On the last mission his P-47 was hit by flak and badly damaged. Knight attempted to nurse the crippled aircraft back to an Allied base but crashed in the Apennines. To Knight went a posthumous Medal of Honor, the only one to a fighter pilot in Italy and the sole award of this decoration to a P-47 pilot in Europe.

One of the Twelfth's P-47 groups, the 324th, never returned to Italy and continued to support the ground campaign in southern France, being absorbed into the new joint U.S./French command in November, the 1st Tactical Air Force. The French element included two fighter groups equipped with P-47Ds and these units, trained in North Africa, operated through southern France and into Germany during the final days of the war in a similar capacity to the U.S. P-47 groups.

There was also a unique P-47 squadron operating in Italy during the final six months of the war, the 1st Fighter Squadron of the Brazilian Air Force, which operated as a fourth squadron with U.S.A.A.F.'s 350th Fighter Group and had an average unit establishment of 25 aircraft. Personnel had been trained on the Thunderbolt at Suffolk A.A.B., Long Island in the summer of 1944 and sent overseas under the command

REPUBLIC P/F-47 THUNDERBOLT

Key to 2-page general arrangement line drawings. (P. 40/41)
NOTE: Fuselage cross-sections annotated A to K; section J is view of turbo-supercharger exhaust's flight hood cover.

1. Tail light
2. Tail jacking point
3. Whip aerial
4. Intercooler exhaust doors (if seen in open position, military markings are apparently distorted—see various photographs)
5. VHF aerial, vertical blade (wire aerial enters starboard side of fuselage through insulated fair lead)
6. Main fuel tank access point
7. Forward gunsight bead (not always fitted)
8. Drop tank shackles and locking pads
9. Gate for excess exhaust gas
10. Exhaust shutters for oil coolers
11. Engine cowl cooling gills
12. Oil tank access panel
13. Hamilton Standard Hydromatic propeller (13ft.)
14. Streamline fairing flight hood to turbo-supercharger exhaust
15. Turbo-supercharger compartment air vent
16. Wing root detail showing panel lines normally obscured by wing dihedral
17. Inboard main wheel well door
18. Undercarriage leg covers (overlaps when leg is extended prior to retraction)
19. Navigation lights
20. Camera gun port
21. Pylon (faired but without shackles)
22. Cabin air conditioning intake
23. Air intakes to oil coolers, port and starboard and supercharger intercooler (centre)
24. VHF whip aerial
25. Pitot head
26. Adjustable aileron trim tab (port wing only)
27. Ammunition bay door
28. Ammunition bay door latch
29. Shock strut bleed-valve access point
30. Landing lamp (retracted; rotates 90° forward)
31. Gun bay door
32. Link and cartridge ejector chutes
33. Aileron fixed trim tab (starboard wing only)
34. Flaps (port and starboard)
35. Cooling air inlet louvres
36. Adjustable trim tab to aileron
37. Fixed trim tab to elevator

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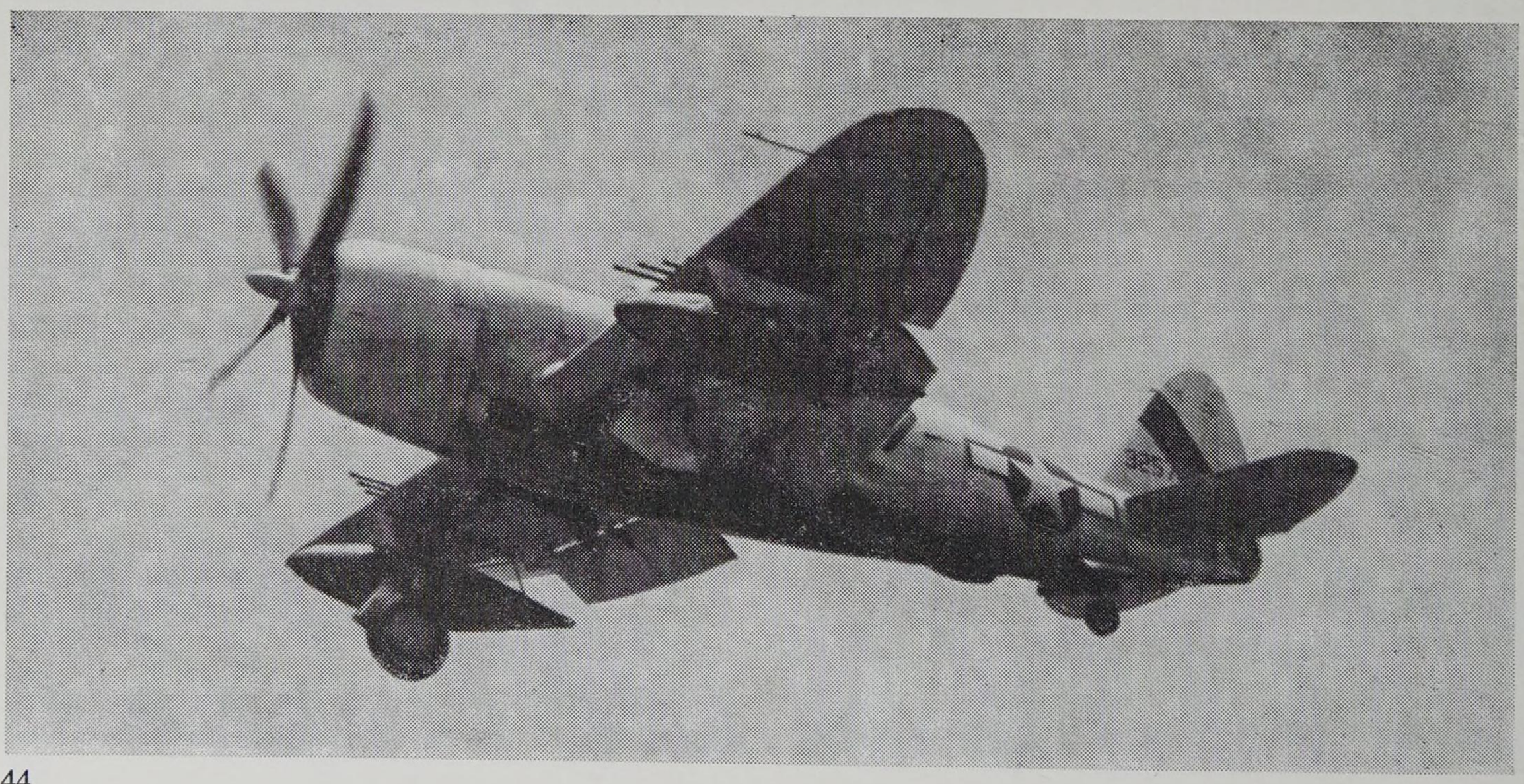
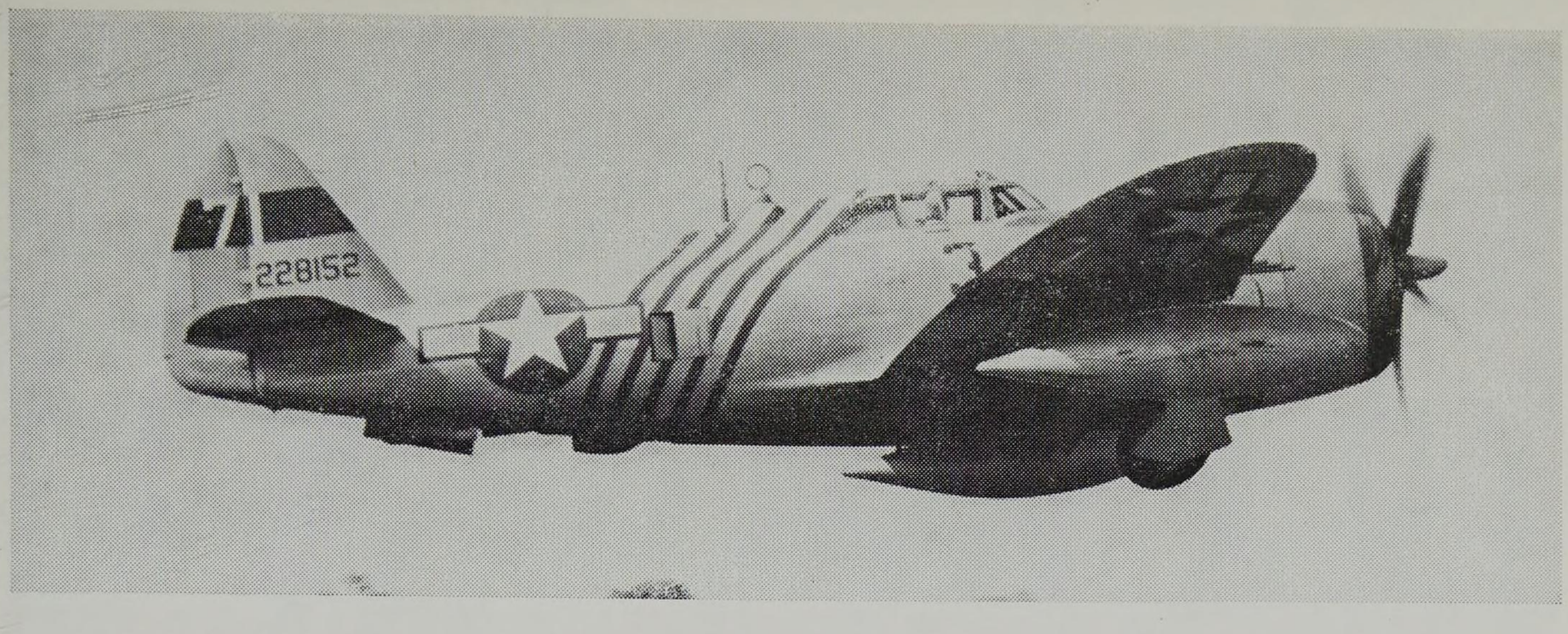
of Lieutenant-Colonel Nero Moura, formerly an adviser to the Brazilian Air Ministry. The unit arrived in Italy on October 5, 1944 and the first five operational sorties were flown on the last day of the month. Most of its missions were dive bombing attacks on enemy transportation system targets and 991 U.S. tons were eventually delivered. Nine pilots were killed during operations when their aircraft were hit by ground fire. Nickname of the unit was 'The Ostriches', based on the comic bird in the squadron badge. Brazil received 88 P-47Ds during the war, equipping another unit at home.

One other air arm flew the Thunderbolt against Nazi Germany: the Soviet Union. Two hundred and three P-47Ds were sent to Russia in 1944, but seven were wrecked in Persia prior to delivery. However, as to with what success these were employed by Soviet pilots, little is known. Although information suggests that the Russians considered the aircraft too heavy for their purposes, it is also probable that they were

Last of the first batch of P-47D-23-RAs comes in to land at a Chinese base. Aircraft is assigned to 81st Fighter Group.





A distinctively marked (5 diagonal blue stripes) P-47D-23-RA of 1st Air Commando Group takes off from a Burmese air strip. D/F aerial was installed on most A.A.F. P-47s sent to the C.B.I. (Photo: U.S.A.F.)

reluctant to praise a machine largely created by a misplaced native of Georgia.

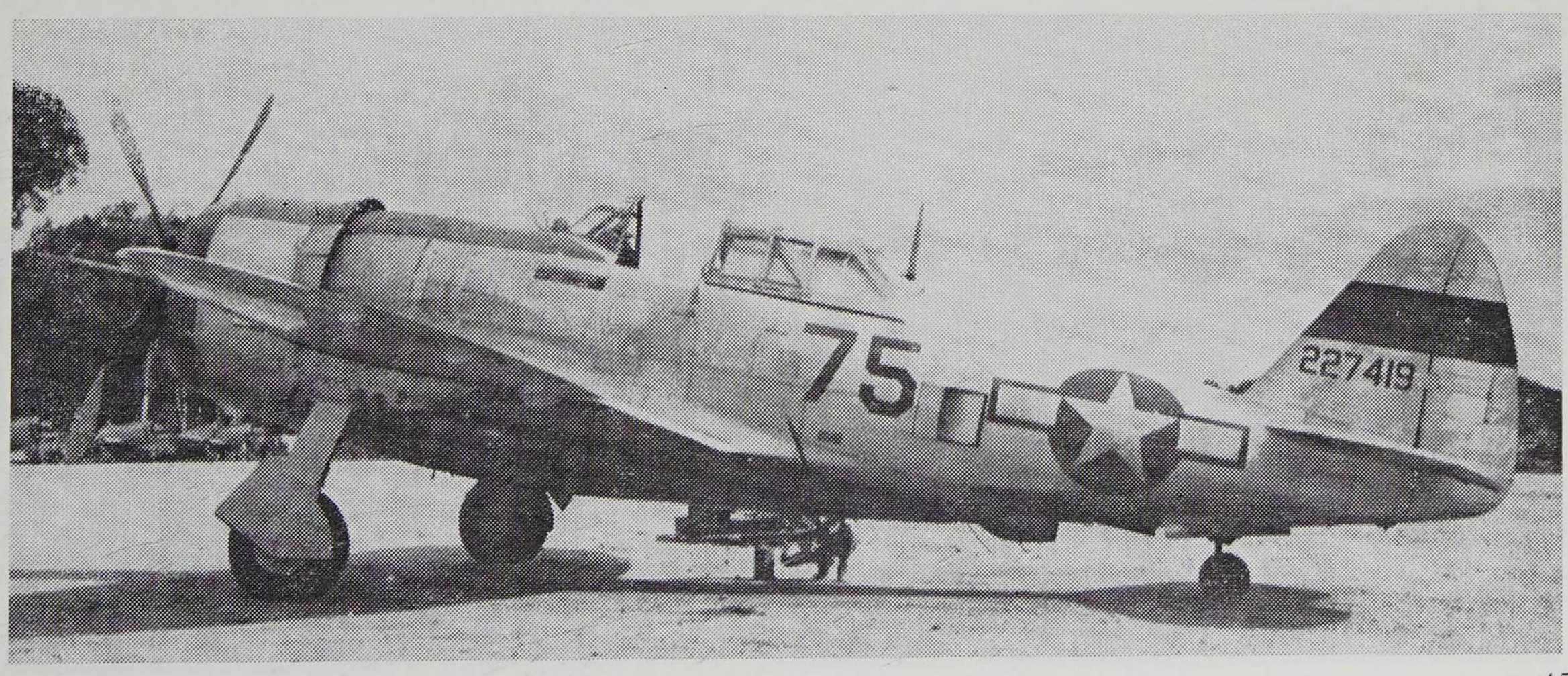
With Germany beaten came the time to assess the P-47's part in this victory. Figuratively, some 86,000 rolling stock items and 9,000 locomotives on the enemy's rail system could be credited as destroyed during ground attack by Thunderbolts. On the roads 68,000 motor vehicles plus 6,000 armoured cars and tanks had been laid waste, to say nothing of 60,000 vehicles drawn by horses—pilots confessed that attacking a horse-drawn vehicle was the thing they abhorred most.

The Thunderbolt had earned the respect of both friend and enemy. Ground crews of the Ninth Air Force had taken the P-47 from one makeshift base to another in the move across Europe and found the aircraft reasonably hardy and easy to maintain. Its durability was considerable and many of the P-47D-15s and 20s that were original equipment when the groups started out from England were still going strong in May 1945. One outstanding example was 42-76516, 'Magic Carpet', flown by the commanding officer of 366th Fighter Group. In 175 sorties it never once turned back through mechanical trouble. Some of the original P-47Cs that had equipped the first Thunderbolt Group in England were still flying having put on many hundreds of hours in training duties with the 495th Group at Atcham.

Some 30 machines retired from combat were equipped to carry air/sea rescue equipment and employed as patrol aircraft over the North Sea. Others were assigned to target moving and special fast communications work. Towards the end of hostilities practically every P-47 group in Europe had one or two machines adapted to carry a passenger. The two-seat conversions were made by the removal and repositioning of radio equipment and oxygen supply, cutting away the fuselage directly aft of the pilot, fitting a seat with necessary stress members. The canopy took various forms. In most cases it was an extension of the original with a hinged section to allow the passenger access. These two-seat P-47s were chiefly used for local flights but in some instances they flew on combat missions carrying an observer.

During the last few days of the war in Europe a few P-47N models arrived in the United Kingdom and were being made ready for operational squadrons when hostilities ceased. They were not long in being shipped out again, for this longer-ranged Thunderbolt was needed to finish the fight against Japan.

Another P-47D-23-RA but with D/F aerial removed. This aircraft was assigned to the 90th Fighter Squadron at Ting Kawk-Sekan, Burma, in late 1944. (Photo: Ken Sumney) 80 FG



Ground crew painting the Mexican national insignia on a P-47D assigned to the 201st Squadron at Mindoro Airfield in the Philippines' August 1945. (Photo: U.S.A.F.)

WITH THE R.A.F.

AFTER the U.S.A.A.F., the largest operator of Thunderbolts in the Second World War was the Royal Air Force. Over 800 P-47Ds were allocated to the British under lend-lease terms and; most were delivered to be employed in the South-East Asia theatre.

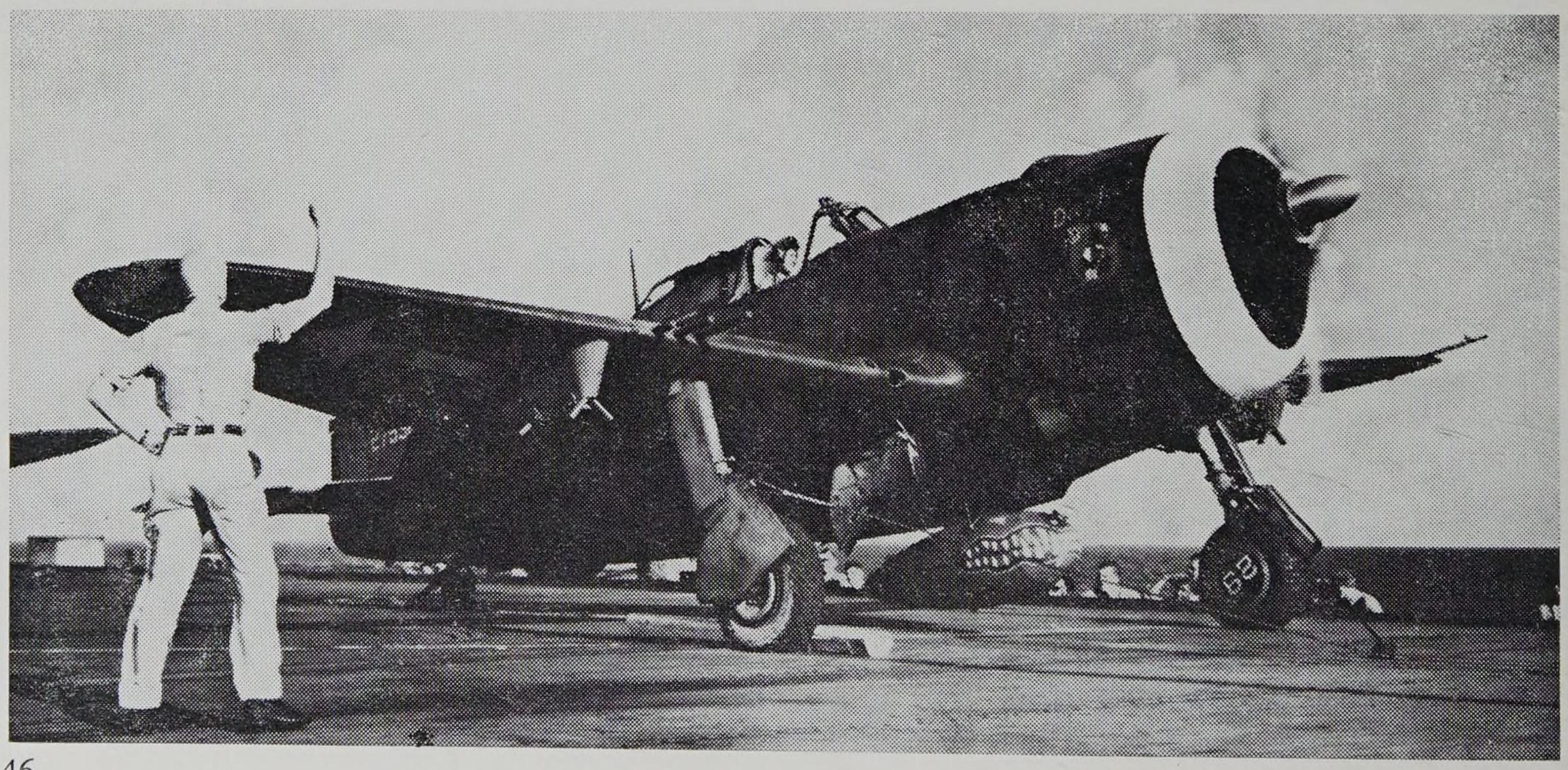
By the time the first production Thunderbolts began to come off the Farmingdale line the R.A.F. had been flying combat operations with many aircraft types stemming from the U.S. aviation industry. They were impressed by the usually sound design and construction of these aircraft even if some were wanting in performance and other respects. The British Air Ministry had kept its eye on the P-47's progress from an early date and on May 26, 1942, it was arranged for one of their test pilots to fly a P-47B.

At this time the Thunderbolt was offered as a high altitude interceptor and while the R.A.F. had no requirement for such an aircraft, they were well enough impressed by this early evaluation to negotiate an order. They saw the P-47 as a useful offensive fighter but undoubtedly they were influenced in their eventual employment of the type by the success of the U.S.A.A.F. in promoting the P-47 first in an escort role and then as a tactical fighter.

The first 240 Thunderbolts consigned to the R.A.F.

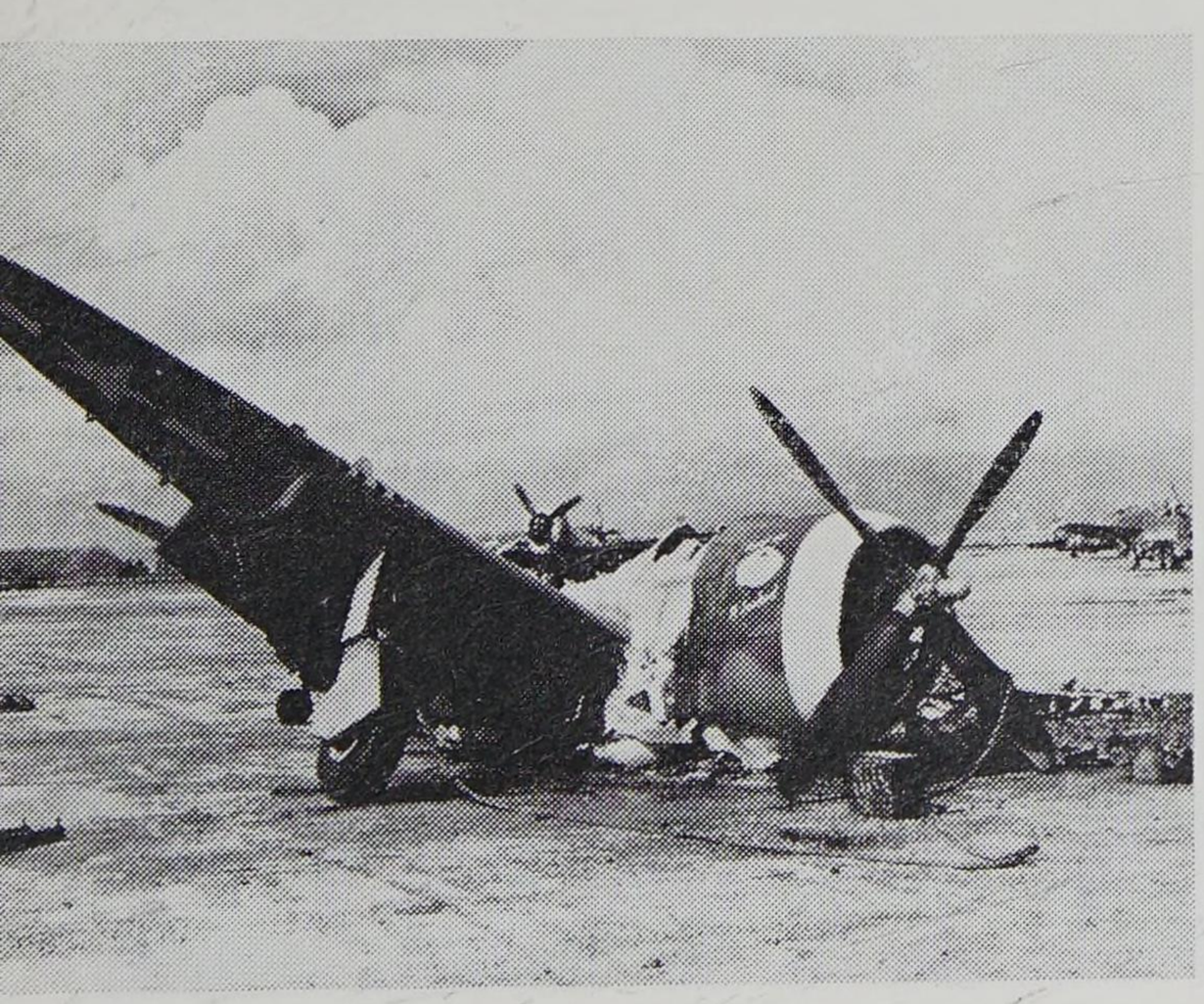
'Dee Icer', of 73rd Fighter Squadron about to be catapulted from the deck of the U.S.S. *Manilla Bay*. (Photo: U.S.A.F.)

318 FG



were from the D-20 series and in that service's terminology became Thunderbolt Mk. Is. One aircraft (FL 844) was evaluated in the U.K. and used for experimental work with drop tanks at Boscombe Down, but most were shipped from the U.S.A. to India and when assembled flown to a conversion unit at Yalahanka (near Bangolore). First R.A.F. squadron to receive the Thunderbolt I was No. 146 under Squadron Leader L. M. O'Leary, which began conversion in May 1944 and flew its first operations on the Burma front in the following September. Shortages of spares and special tools delayed progress with working up squadrons to operational status and the second squadron No. 135 was nearly five months in training and waiting for equipment. Thunderbolt IIs, the 360° vision bubble canopy version, arrived in September, and the supply of trained pilots and aircraft was sufficient to see nine squadrons in action by the end of the year (5, 30, 79, 123, 134, 135, 146, 258 and 261). Unit establishment was 16 aircraft. Nearly all these squadrons had previously been employed in ground support operations for the British 14th Army and this continued to be their role with the Thunderbolt. Flights were frequently despatched on 'cab rank' patrols, and when called on by the Army they would descend to attack the offending Japanese target—tactics similar to those used by Allied fighter-bombers in Europe. Moderate angle dive-bombing, usually with 500lb. bombs, was carried out from 8,000ft. with a pull out at 1,500ft. Other types of operations for the Thunderbolts were strafing attacks on enemy airfields and escorts, chiefly for cargo carrying Dakotas supply dropping to forward troops. Air combat with Japanese aircraft was infrequent and usually on a small scale, besides which the Japanese were generally good at evasive tactics. A typical instance is the bombing raid of December 13, 1944 when Liberators with Thunderbolt escort attacked rail bridges. The lower cover of Thunderbolts went down to attack A.A. positions and the higher elements descended to between 12 and 18,000ft. to give them cover. The latter were then 'jumped' by about ten Oscars. The Thunderbolts dived to 10,000ft. to evade them while the enemy aircraft tried to get on their tails. A series of indeterminate combats followed without loss to either side. The Oscars then made off but encountered a third section of Thunderbolts. Although this time the Thunderbolts had the advantage, the Oscars' caution and good evasive action saw only a probably destroyed claim and a damage claim made against them. The pace of offensive operations increased early in 1945 and as the front moved into Burma the Thunderbolt squadrons often found they had to fly 200 miles or more to a target. Metal drop tanks classified as 75, 100 and 150 Imperial gallons were used to extend ranges and some of these were manufactured in the theatre. Another squadron, No. 34 became operational in March and another started conversion. In April some squadrons were assigned to the operation *Dracula*, the landing that culminated in the capture of Rangoon. After this the weather took a hand in curtailing operations as the monsoon broke and airfields became so muddy that take-off was often impossible even if the weather had allowed flying.

73rd Fighter Squadron's 42-75379, alias 'Head-up N 'locked', which was set alight by a Japanese soldier on 26th June, 1944. (Photo: U.S.A.F.)



Change of Designation

In the summer of 1945, No. 60 squadron went over to Thunderbolts and three of the existing squadrons had a change of number designation as was the occasional whim of authority. Operations, however, were limited by the scarcity of targets and the cessation of hostilities brought rapid disbandment of most units. Only 60 and 81 Squadrons remained and these later played a part in the Dutch East Indies troubles with Indonesian patriots. On November 1, 1945, three Thunderbolts on offensive reconnaisance over Magelang area of Java went into action, the first such R.A.F. sorties since hostilities against the Japanese ceased. Four lorries were amongst targets straffed but results were unobserved. Similar incidents occurred over the next few months until British participation ceased. On a number of occasions Thunderbolts of 60 Squadron dropped news and propaganda leaflets from their wing shackles.

Most R.A.F. pilots came to the Thunderbolt from Hurricanes and Spitfires and their opinions of the former tended to be based on comparisons with the British fighters. The good points can be summed-up as follows: Excellent flight stability, which made formation flying no problem and also allowed more accurate attack dives on targets. Dive bombing accuracy with the Thunderbolt was much higher than with other types of fighter used in Burma. At high altitude its handling characteristics did not deteriorate appreciably even above 30,000ft., whereas a Spitfire tended to become rather unstable at 25,000ft. The aircraft also had no vices in take-off and landing, while the wide track undercarriage gave good ground stability that was advantageous on some of the rough strips from which operations were flown. Range was another good feature and 1,000 mile, 5-hour flights were possible.

Merlin engines were dogged with coolant leaks and other problems in tropical climates, so the comparatively trouble-free Pratt & Whitney radials were soon approved of, many pilots considering them the most reliable aero-engines they ever flew behind.

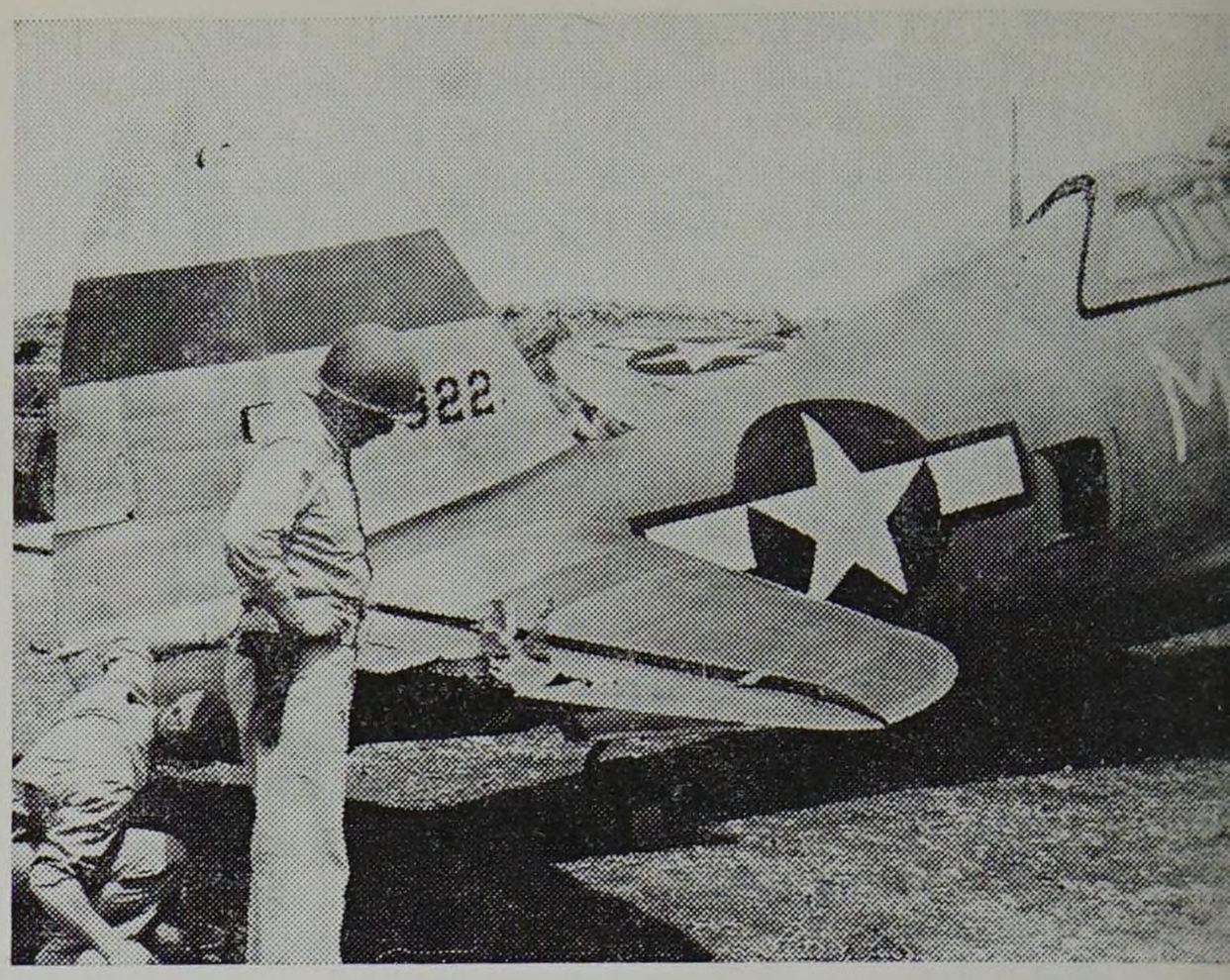
The cockpit was much favoured as it provided plenty of room for the bulky jungle survival gear that was attached to a pilot. To Flight-Lieutenant Jack Knight of 134 Squadron: 'Sitting in the cockpit was a revelation. One immediately felt rather like Charles Smart* at a cinema organ, not only because of the vast array of dials and switches, but the spaciousness of the cockpit itself. Both the Spitfire and the Hurricane seemed to be built around the pilot—one could almost do physical jerks in the Thunderbolt.'

**Popular British Entertainer.*

R.A.F. pilots were equally in agreement on the Republic's shortcomings. The fat fuselage and large nose made taxiing difficult and only safely accomplished by a zig-zagging movement which allowed a view forward over the wing. Very long take-off runs—a mile in some conditions—contrasted with the short hops of the Spitfire. High landing speed; in the order of 150m.p.h. on approach and rounded out at 120m.p.h. with power to prevent too rapid rate of descent (a Spitfire used glide approach technique with engine fully throttled back). Poor rate of climb and poor rate of turn were, however, the chief complaints. Flight Sergeant Ron Capewell of 135 Squadron once had a Liberator turn inside him during low speed simulated interception! Nevertheless, R.A.F. pilots soon came to appreciate the hardiness of the Thunderbolt and with trained pilots fatal accidents and losses were few. One squadron lost only one pilot in six months intensive operations with the type. Like their U.S.A.A.F. colleagues, R.A.F. fliers also realised that if one was going to be involved in a crash, a Thunderbolt was about the best aircraft to be in. During a night operation by 615 Squadron from Akyab during the summer of 1945, a Thunderbolt piloted by Flight Sergeant Hutchinson failed to become airborne through lack of power and crashed off the far end of the runway. His absence was not noted until the squadron had assembled in formation and Hutchinson failed to appear in his allocated position. The leader immediately informed ground control who concluded that the missing aircraft had crashed. A crash tender was desptached up the airstrip and had not gone far when a figure was observed in the gloom. The crew stopped and enquired if the stroller had heard or seen a crash and if so where. The undoubtedly graphic reply is not recorded, but this was Hutchinson who having extracted himself unscathed from the wreckage of his fighter, and finding no help forthcoming, had set off back down the airstrip on foot.

Special Recognition Bands

As in Europe, special white recognition bands were applied to Thunderbolts with the object of preventing attacks by Allied pilots who mistook them for



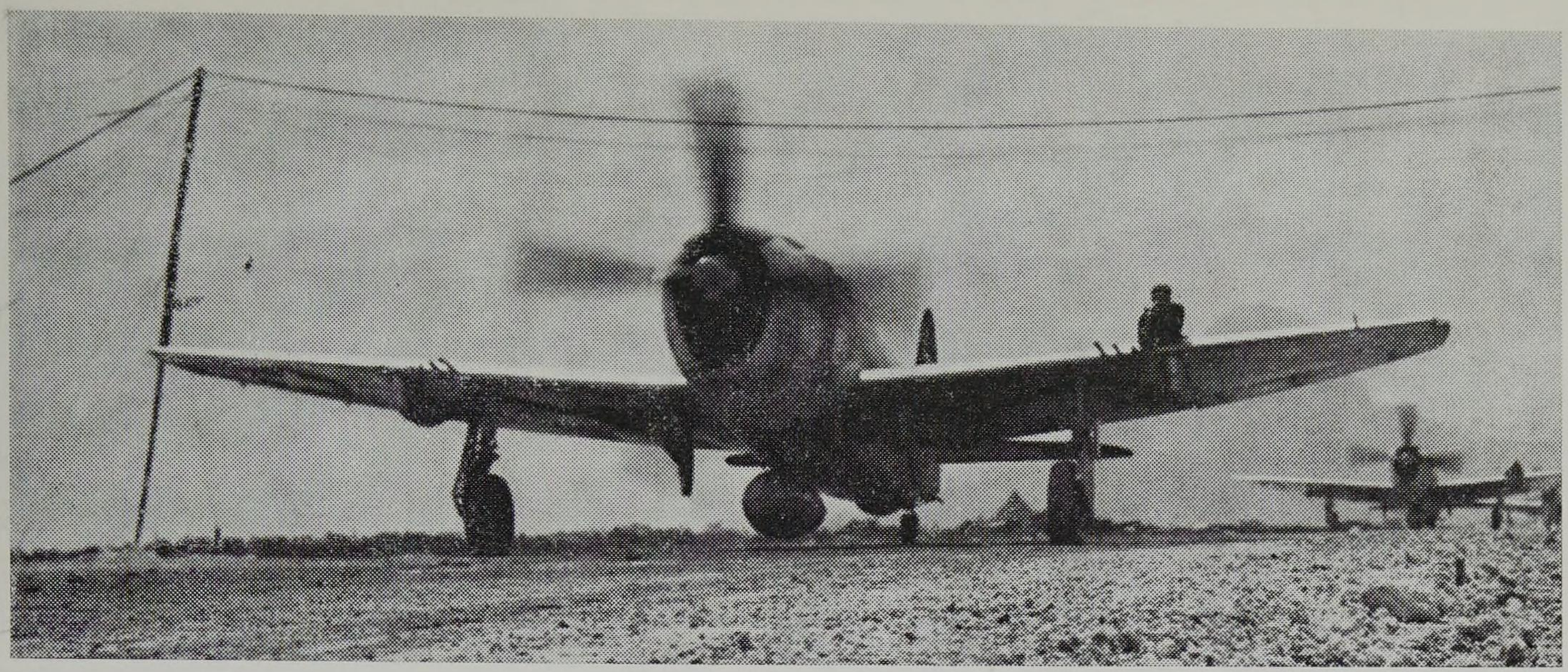
Major Harry McAfee inspects the first of his squadron's aircraft hit by Japanese ground fire on Saipan. 19th Fighter Squadron removed the paint from the tails and cowls of their P-47s as a distinctive marking. (Photo: U.S.A.F.)

Japanese types. On one occasion a flight of 134 Squadron was vectored to intercept six plus Japanese fighters converging on Cox's Bazaar. The leader of the Thunderbolt's kept a large circuit round the area looking frantically for the enemy aircraft which he was constantly being told were now actually over Cox's Bazaar. Spitfires appeared above which were presumed top cover. The Thunderbolt pilot's comfort through having top cover was short-lived as the Spitfires came down on them with 'Cannon ports twinkling.' Apparently the ground observer posts for raid reporting had identified and plotted the Thunderbolts as Japanese fighters.

At least three R.A.F. Thunderbolts were evaluated in the United Kingdom, including the first of the Mk. II order (HD 182) and the last, a P-47D-40-RA, KL 887. Some of the final batch of Mk. IIs were left in natural metal finish.

The R.A.F. encountered few mechanical difficulties

Major McAfee about to take off in his personal P-47D-20-RA (43-25429). Two 1,000 lb. H.E. bombs are slung on wing pylons. (Photo: U.S.A.F.)



Taxiing along the airfield perimeter of the rocky Ie Shima, ground crew personnel are needed to guide the P-47Ns of 73rd Fighter Squadron. (Photo: U.S.A.F.)

with its Thunderbolts. The Mk. IIs featured the new paddle-blade Curtiss Electric propellers which were troublesome. Over-speeding with fine-pitch going straight into fully-coarse was an unpleasant experience for any pilot and disastrous if this occurred during take-off or low approach. The U.S.A.A.F. also experienced similar difficulties. The Curtiss Electric, which supposedly had both operational and installational advantages over the Hamilton Hydromatic propeller, was introduced into production again with the P-47D-28-RE.

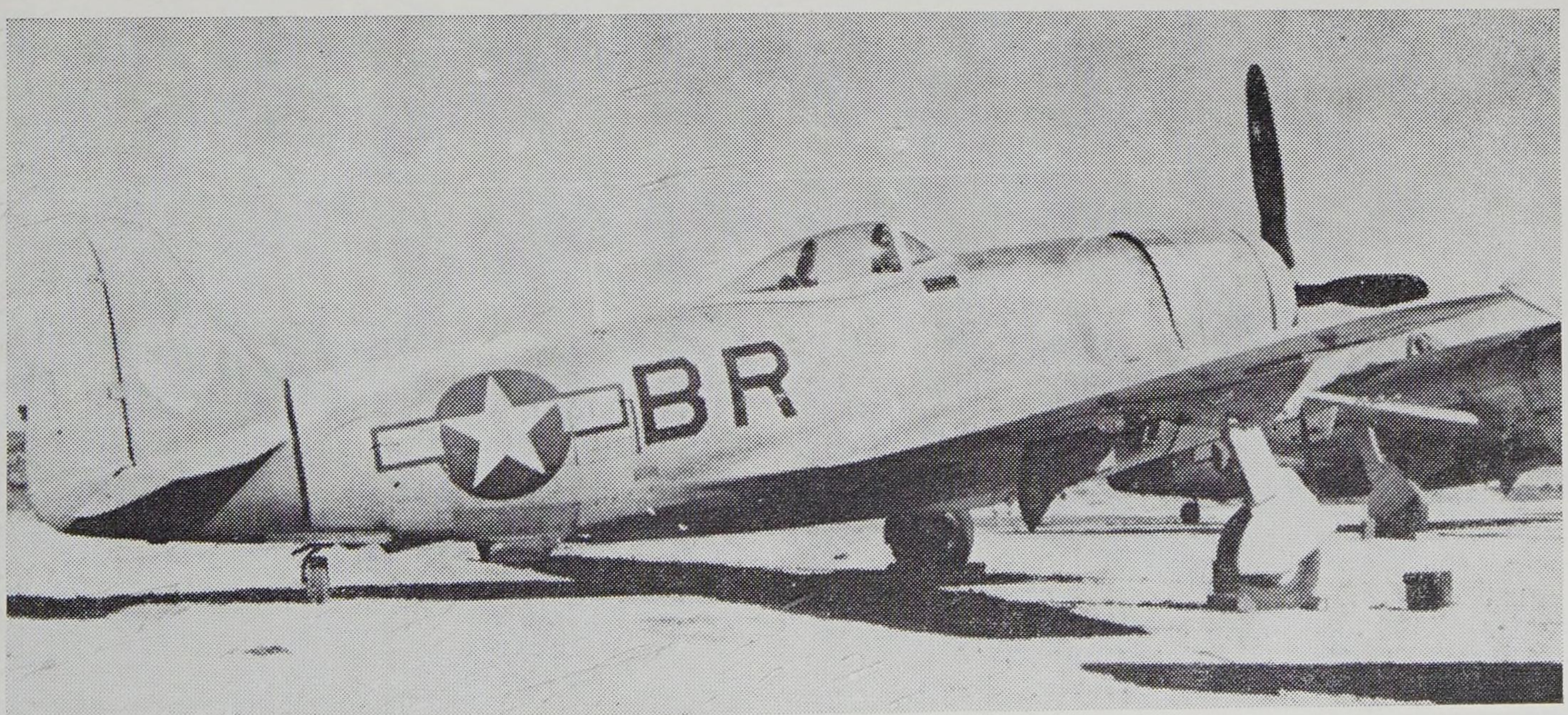
An unpleasant and mysterious manifestation saw a few Thunderbolts exploding during dive bombing attacks. An explanation was eventually found in ruptured fuel tanks from which fuel fumes had found their way into the supercharger ducting during a high speed dive, been ignited and the resulting explosion disintegrated the aircraft.

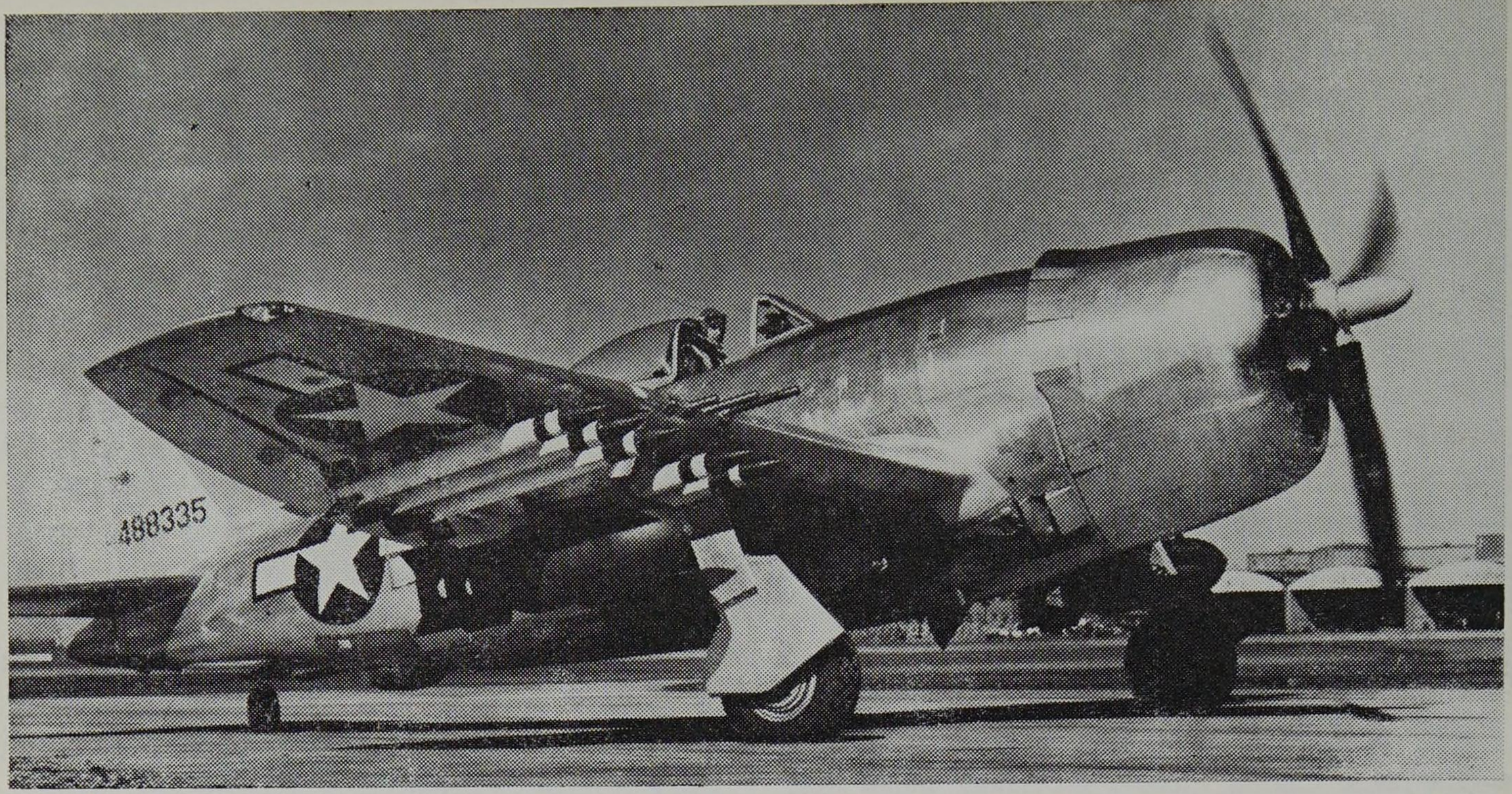
In addition to the R.A.F. units, the U.S.A.A.F. had eight P-47-equipped squadrons operating on the Burma front at one time. The 80th Fighter Group, second unit trained on the P-47B but sent to India and given P-40s, finally received Thunderbolts in the spring of 1944. Its duties were much along those of its R.A.F. counterparts although it spent a good deal of time protecting the busy C-46 and C-47 air lines to China 'over the Hump.'

The Japanese were well aware of the dependence of Allied ground forces on supplies from the air and were very adept at making sneak attacks upon the transports. During one such interception on the afternoon of December 14, 1944, a P-47 used its ability to execute violent vertical manoeuvres to evade its pursuers with an unusual outcome. Nine C-47s supply-dropping to British troops on the Bhamo-Namhkam road were attacked by a dozen Tojos, which were in turn attacked by the escorting P-47s. Two Tojos were quickly destroyed but not before a C-47 had been shot down and five others damaged. During the dog-fight that followed two Tojos used their low altitude advantages in climb and turning to get on the tail of one Thunderbolt. The American pilot, aware of his predicament, executed a 'vertical reverse' which the Tojos attempted to follow but collided with one another. Both were seen to come apart in mid-air.

When the Allies were established firmly in Italy the U.S.A.A.F. found that it had a surplus of fighter groups in the Mediterranean and despatched two, the 33rd and 81st, to India where they trained on Thunder-

Distinctive heart marking was used as insignia on some 21st Fighter Squadron P-47Ns. (Photo: E. D. Schlueter) 413FG

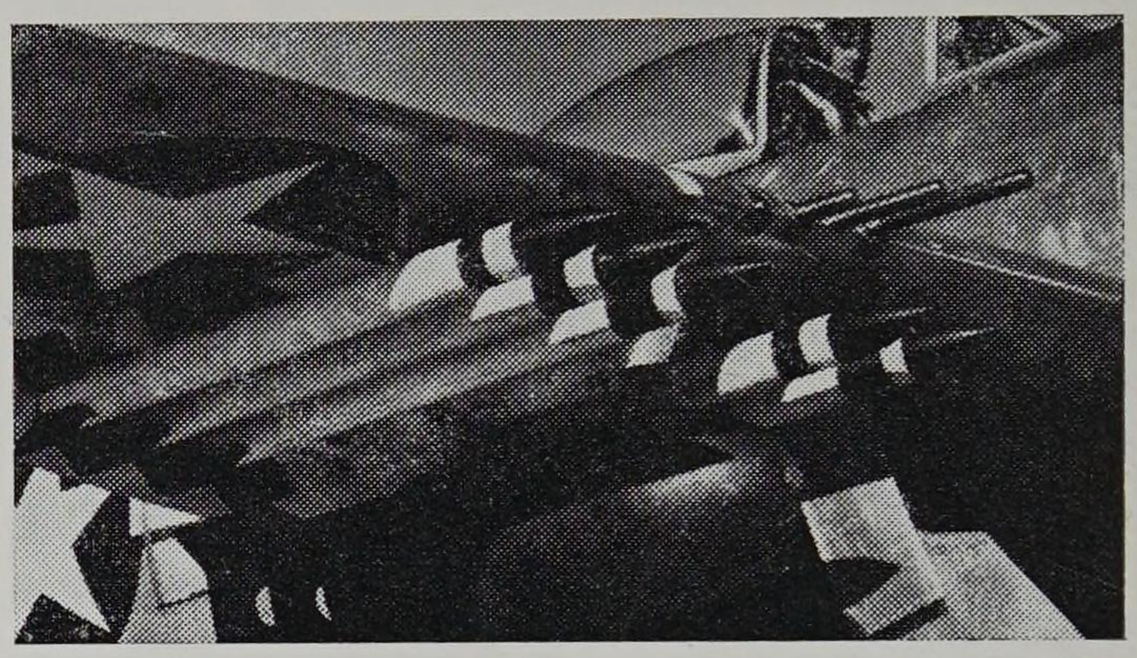




Detail of 'zero rail' rocket installation and 1,000 lb. bomb which made the 'N' a formidable ground-attack aircraft. (Photo: Republic)

bolts with the original intention of defending B-29 bases. In April and May they were sent to the U.S. 14th A.A.F. in China to take up these duties. The 81st remained until the end of the war but the 33rd moved back to India in September 1944, having been exchanged for a P-51 group. It too moved with the R.A.F. into Burma and flew ground support missions until the capture of Rangoon and the monsoon brought a halt.

The other two squadrons were the 5th and 6th Air Commando (Fighter), units of the 1st Air Commando Group, an organisation originally established to give air support to General Wingate's raids behind the Japanese lines. The Group at one time included bomber, fighter, liaison and transport elements, but after re-organisation into squadrons during the summer of 1944 it lost the bombers and became principally involved in forward support of troops. The two fighter squadrons which converted to the P-47 from P-51As were often despatched on separate ground attack strikes. In May 1945, however, these two units reverted to the Mustang which was more suited to



their purposes involving the use of small forward landing strips.

A notable feature of many U.S.A.A.F. P-47Ds flying in the C.B.I. (China-Burma-India theatre) was the addition of a direction finding loop aerial. The vastness of the territory over which operations were conducted, and the limited ground radio control in some places made this installation of great value.

Servicing recently arrived P-47Ns of 464th Fighter Squadron, 507th Fighter Group, on Ie Shima. Many of these aircraft were N-1-RE's incorporating modifications and redesignated as N-2-REs. Note yoke rod from rear of wing pylon to drop tank. This prevented tank hitting wing and damaging flap when released. (Photo: U.S.A.F.)

Yellow tail surfaces with blue triangles adorned 463rd Fighter Squadron's P-47Ns. This photograph was taken at some 30,000 ft., an altitude where the heavy aircraft gave its best performance. (Photo: R. T. Forrest)

507 FG

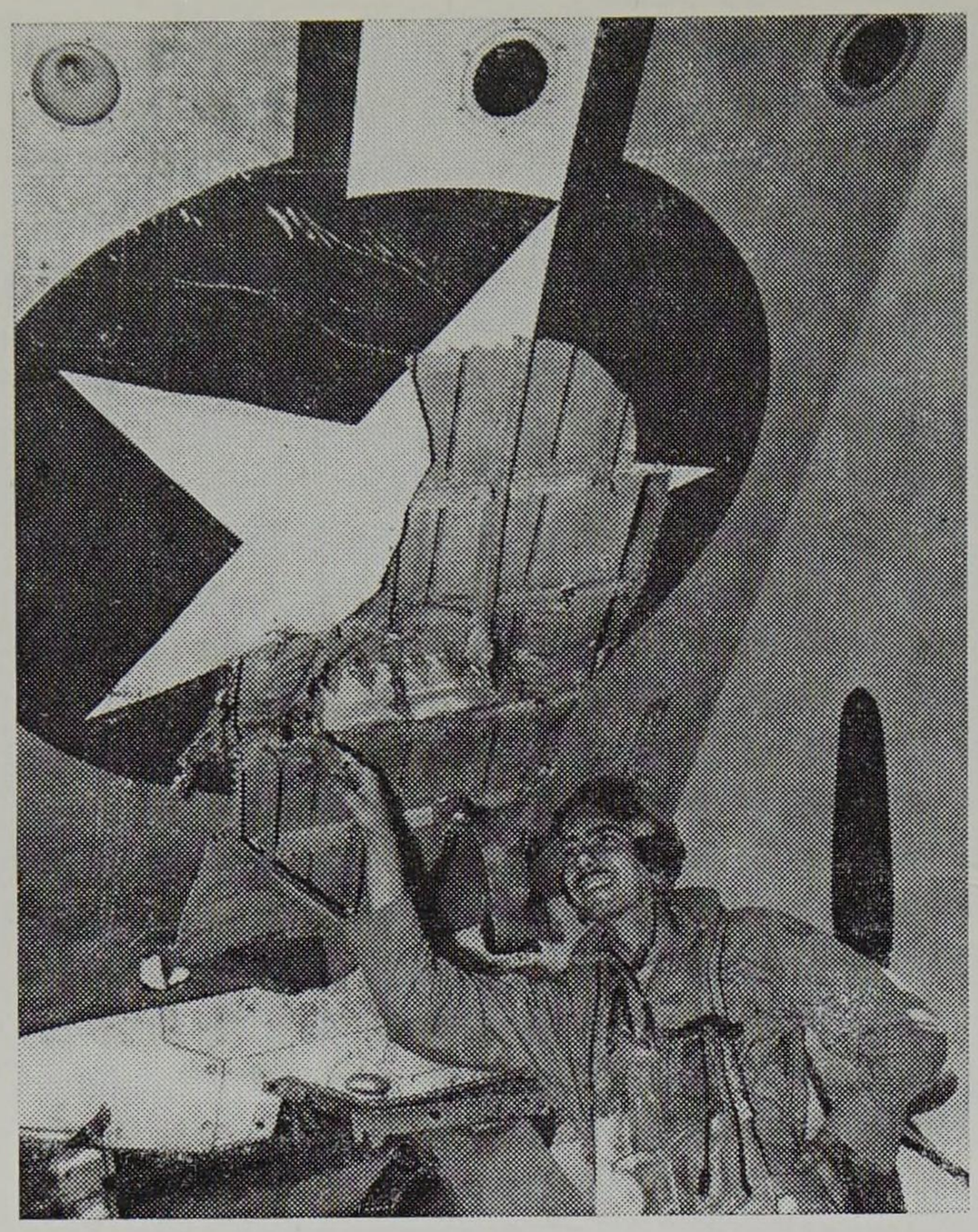
ENTER THE 'N'

WHEN Germany was defeated in May 1945, the United States air forces engaged with the Japanese in the south-west and central Pacific areas included only two fighter groups with P-47s. In the 5th Air Force, the 58th alone remained of the three groups that had flown the type during the long and difficult liberation of New Guinea and the Philippines—the 35th and 348th Groups having converted to P-51 Mustangs. A fourth squadron had been attached to the 58th Group early in 1945, the 201 Fighter Squadron of the Mexican Air Force. This unit, under General P. A. Antonio Cardenas Rodriguez, had been trained in the U.S.A. on the Thunderbolt and, equipped with P-47Ds, the 201st saw action in the last stages of the campaign on Luzon. Later it moved with the 58th to Okinawa and operated chiefly against Kyushu, the southernmost island of Japan. Its war record comprised 96 combat missions during which seven pilots were lost.

The other Thunderbolt group was the 318th, a unit of the 7th Air Force functioning in the central Pacific area, which had literally been catapulted into action in June 1944. The Group was formed in 1942 for the air defence of Hawaii and its early days were spent in training and flying patrols. It received P-47Ds early in 1944. In June that year U.S. forces opened a campaign to secure the Marianas Islands for the building of bases from which strategic bombers (B-29 Superfortresses) could operate against the Japanese homeland some 1,500 miles distant. The first island invaded was Saipan. To ensure prompt air support for the ground troops it was decided to transport the P-47Ds of the 318th to the first available captured airstrip. After flying from their station at Bellows Field, Hawaii, to an airfield that adjoined the dock at Ford Island naval base, the 71 P-47Ds were hoisted by crane aboard two escort-type aircraft carriers. The carriers sailed on June 5, refuelling at Eniwetok and reaching the Marianas in the middle of the month, where four Japanese bombers unsuccessfully attempted to bomb them. On June 22, 23 and 24, successively all P-47s were safely catapulted from the carrier decks—the only such occasion apart from experimental trials. This was only a week after the invasion, and with some enemy positions still within sight of the Group's airstrip. The 318th engaged in support missions which, typically, would entail one flight strafing a Japanese gun position either to: kill the gunners or drive them to cover, and so allowing a following flight to glide-bomb the position unmolested. One Thunderbolt met its end in an unusual way. On the night of June 26, several Japanese soldiers broke into the airstrip perimeter, one managing to get to a P-47 and set fire to it.

During the summer of 1944 the Group supported the invasions of Tinian and Guam, other islands in the Marianas chain, and later when range problems limited its activities with the P-47D, acquired some P-38s and flew missions to other island groups in the central Pacific still under Japanese occupation. By the spring of 1945, however, U.S.A.A.F. had plans to establish a small fighter force equipped with the new P-47N on island bases even closer to Japan. In April, the pilots of the 318th collected the first of these and flew them by stages over a total of 4,100 miles to the recently captured Ie Shima, three miles off the coast of Okinawa and 325 miles from the Japanese homeland.

Lockheed 300 gal. capacity tanks (similar in shape to 165 gal. tanks) were often carried by P-47N's on long missions. 318th Fighter Group, whose aircraft are being serviced in this picture, had many successful encounters with Japanese fighters in late May 1945. (Photo: U.S.A.A.F.)



Japanese anti-aircraft fire blasted hole through wing and tore away a large area of skin on this 318th Fighter Group P-47N. Undersides of ammunition troughs are exposed. Note coloured downward recognition lights. Pilot is 1st Lt. John Dooling. (Photo: U.S.A.F.)

P-47Ns came into full production at Farmingdale during December 1944 and all 'Ns' to see action in the Pacific War came from this factory. Evansville did not go over from D to N models until the end of the war and only 149 were completed before the contract was cancelled. Although the principal reason for introducing this model was to better endurance by the provision of wing tanks to hold an extra 200 U.S. gallons, the N had a number of other refinements. As previously mentioned, the 2800-57 Double Wasp that had given the 56th Fighter Group trouble in the P-47M, provided the power. Like earlier 2800 models, once the initial difficulties had been overcome—and these were all connected with control mechanisms—it proved an extraordinarily reliable and durable engine. Like the M, the N featured higher output General Electric turbo-supercharger (CH-5 model) and associated items. Designed for long range and flights that with drop tanks could last 10 hours, much was done to alleviate pilot fatigue. The C-1 Automatic Engine Control gave sequential operation of throttle, turbo-supercharger and water injection. Once the pilot selected a power setting the A.E.C. automatically maintained the setting through changes in altitude and aircraft attitude. A General Electric autopilot system took the strain from pilots on long to-and-from target flights which could involve several hundred miles. The P-47N, in fact, was a much simpler aircraft to fly than previous Thunderbolt models and, in consequence, less demanding of a pilot.

Distinguishing Feature

The square cut wing tips were the distinguishing feature of the N and added another 18in. in span and 22sq. ft. in area. Four inter-connected fuel cells were installed near the root in each wing, giving the aircraft half as much fuel again as the D model. Provision was made for 10 underwing 5in. rockets on flush-fitting installations, similar to the British type, with the N-5-RE series. The N also featured a wider tread undercarriage, a matter of some 24in. extra. All these additions meant the inescapable problem of weight coming to the fore again. While empty this amounted to an extra 1,000-odd pounds advance over the P-47D, but even so handling characteristics were not markedly different from the earlier model. Once the full complement of fuel was aboard and drop tanks, bombs or rockets slung from the wing and belly shackles, the N could gross 20,700lb., an all-time high for a single seat, single piston engine fighter.

Increase in Weight

The increase in weight was soon to be appreciated by the men of the 318th Group, for on average another 800ft. were needed to get the P-47N airborne compared with the D model they had relinquished. Once at altitude the N developed more zest than the D having about a 30-miles-per-hour gain in top speed. Manoeuvrability was generally not so good as with the D although from a practical point of view insufficient to affect the machines' value in fighter-fighter combat in the mood of attack practised against Japanese adversaries. The diving attack and zoom climb away still held good as the prudent method of combat with a more manoeuvrable opponent, and like its predecessors, the Thunderbolt's speed could usually be relied upon to get it out of a tight spot. There were, naturally, occasions when speed wasn't available. A unique incident occurred as an outcome of one such lack of power on June 10, 1945 when a squadron of the 318th was conducting a sweep over Kyushu. Seven unwary Zekes were observed below and destroyed in a near perfect surprise attack. Second-Lieutenant Robert J. Stone claimed two but on seeking altitude again he discovered the P-47N's engine would not give full power. At this crucial moment more Japanese fighters hove in sight and noting Stone's sluggish Thunderbolt prepared to stop it completely. Stone did what many pilot before had done in such circumstances, dived for the deck. At paddy-hopping height the aircraft presented an extremely difficult target to its pursuers, an almost impossible one if the course was erratic and Stone ensured that it was. The two Zekes close behind occasionally fired bursts which fortunately missed their target. After skimming the top of a hill, Stone suddenly found himself approaching an airfield and converging on a twin-engined aircraft rising from the runway almost dead ahead. Instinctively, Stone pulled the P-47 up into a left-hand climbing turn in the hope of missing the Japanese aircraft. An explosion rocked the Thunderbolt and Stone's immediate reaction was to believe his manoeuvre unsuccessful. Then to his amazement he caught sight of the flaming remains of aircraft on the ground behind his still flying Thunderbolt. There was no sight of either of his two pursuers or the bomber he had nearly collided with and he could only assume that turbulence created by his sudden climb had caused the lighter Japanese fighters to go momentarily out of control and into the on-coming bomber. Stone's P-47N took him home across 300 miles of ocean to Ie Shima despite the lack of power. Confirmation of the burnt wreckage of aircraft later came from a reconnaissance photograph taken of the Japanese airfield. On this day, the 318th FG brought its claims for enemy aircraft destroyed while operating from Ie Shima to 102. Considerable numbers of Japanese aircraft had been encountered on nearly every mission since the middle of May.

Two other P-47N equipped groups joined the 318th on Ie Shima in May and June 1945. These were part

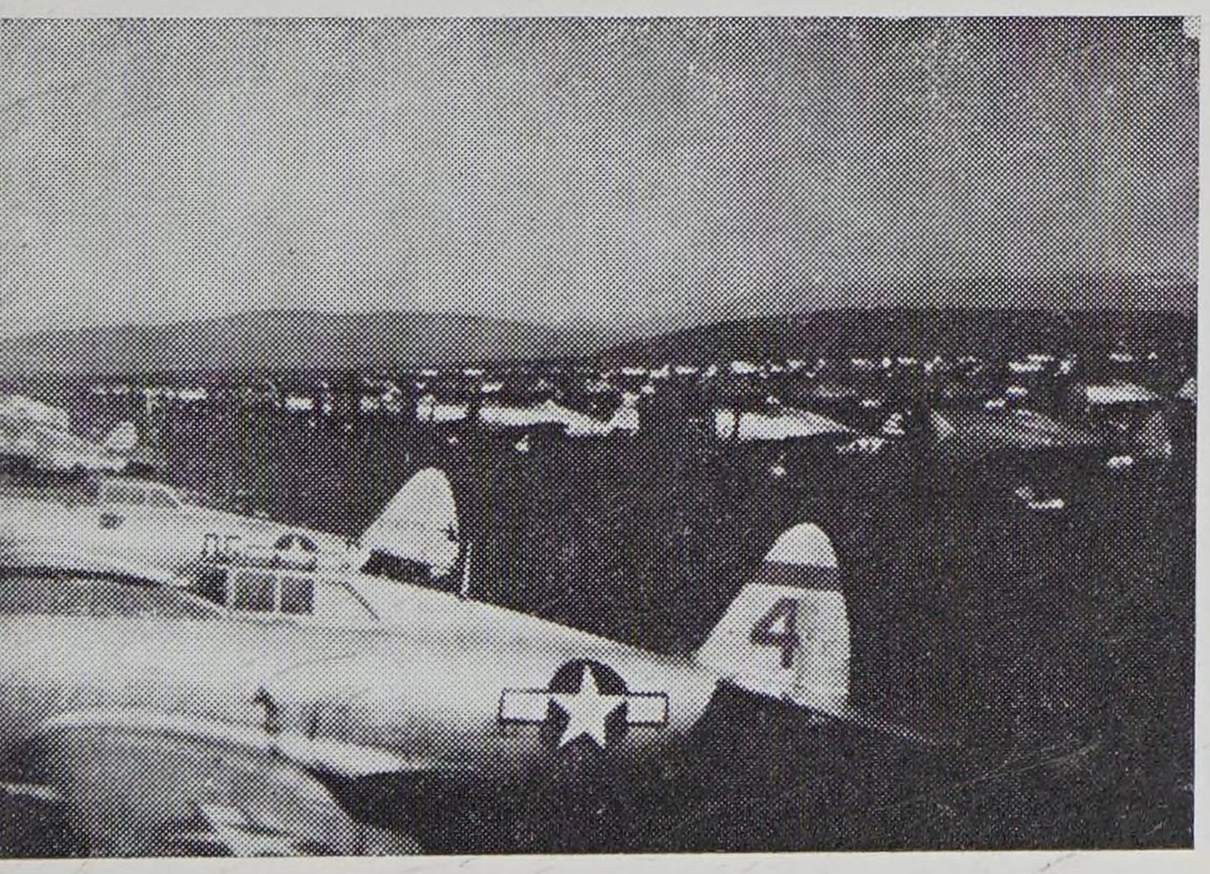
The M-10 smoke tanks fitted to the wing pylons of this 15th Fighter Group P-47D-23-RA were intended for laying defensive smoke screens at low altitude. Hawaii, 1945. (Photo: U.S.A.F.)

of a force of very long range escort fighters activated in the U.S. during October 1944 with the express purpose of providing escort for B-29 Super Fortresses in their strikes against Japan. Four of these groups were trained on the older model Thunderbolts prior to receiving P-47Ns. A change of plan saw one group, the 508th, transferred to Hawaii in January 1945 to take over from another fighter group that had shed its P-47Ds for P-51s and was ordered to the Marianas. The 508th thereafter functioned largely as a replacement training unit and ferried both P-47s and P-51s to the combat units further west.

The other groups started to receive P-47Ns from late January onwards and by early April the first to complete training, the 413th was on its way to Ie Shima. Although a new group, the 413th had two famous squadrons assigned, the 21st and 34th, that had borne the brunt of the air fighting in Java early in 1942. The third squadron was the 1st Fighter. The 507th Group arrived in Ie Shima in June to bring the number of P-47Ns on the island to over 250. Last P-47N group sent out, the 414th, went to the newly-acquired island of Iwo Jima which lay about half way between the B-29 bases in the Marianas and Japan and some 900 miles from the other P-47 groups on Ie Shima.

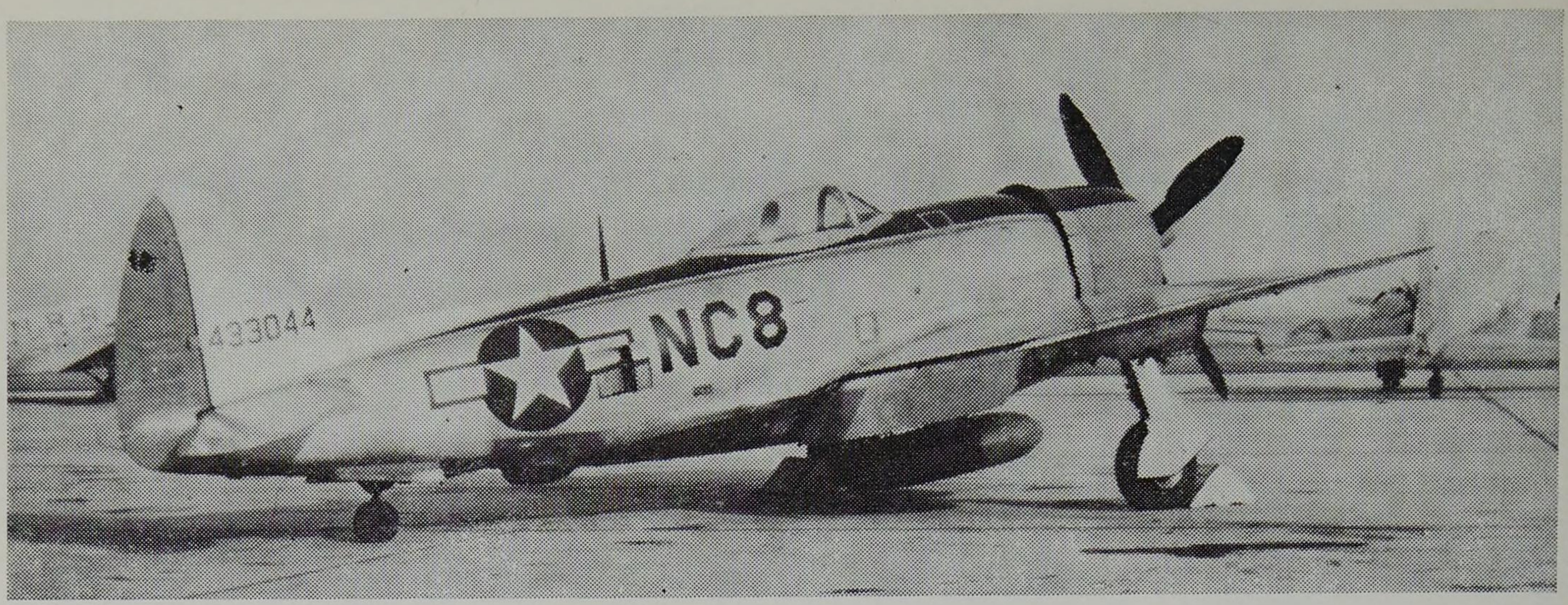
The excellence of the P-47 in ground attack saw the Thunderbolts assigned rarely to escort and often to harrassing anything Japanese that moved on the surface of land or water. Railways, airfields and shipping came in for most attention and the three groups were regularly engaged in using the very telling firepower of their aircraft to create considerable havoc to the Japanese war economy. Only once did the three groups take part in an escort of B-29s on a daylight mission. On August 8, 1945 some 400 B-29s flew to bomb Yawata, a major Japanese steel-producing city on Kyushu. A force of 151 P-47Ns met the bombers before the target and flying at a lower altitude kept watch for any enemy fighters climbing to intercept. They were not to be disappointed as the strongest force of interceptors—about 60—ever encountered over Kyushu appeared and in a swift action 13 were claimed for the loss of five Thunderbolts. Four of the U.S. pilots baled out over the sea. Contact with Japanese fighters was infrequent and the next sizeable battle occurred five days later when the 507th Group ran into a very large formation during a sweep over Korea. The enemy attempted interception but the scoreboard read, after a 30-minute engagement, one P-47N lost for claims of 20 Japanese aircraft destroyed.

P-47s of Ninth and Twelfth Air Forces lined up on R-13, Germany, to await the breakers. (Photo: C. Elliott)

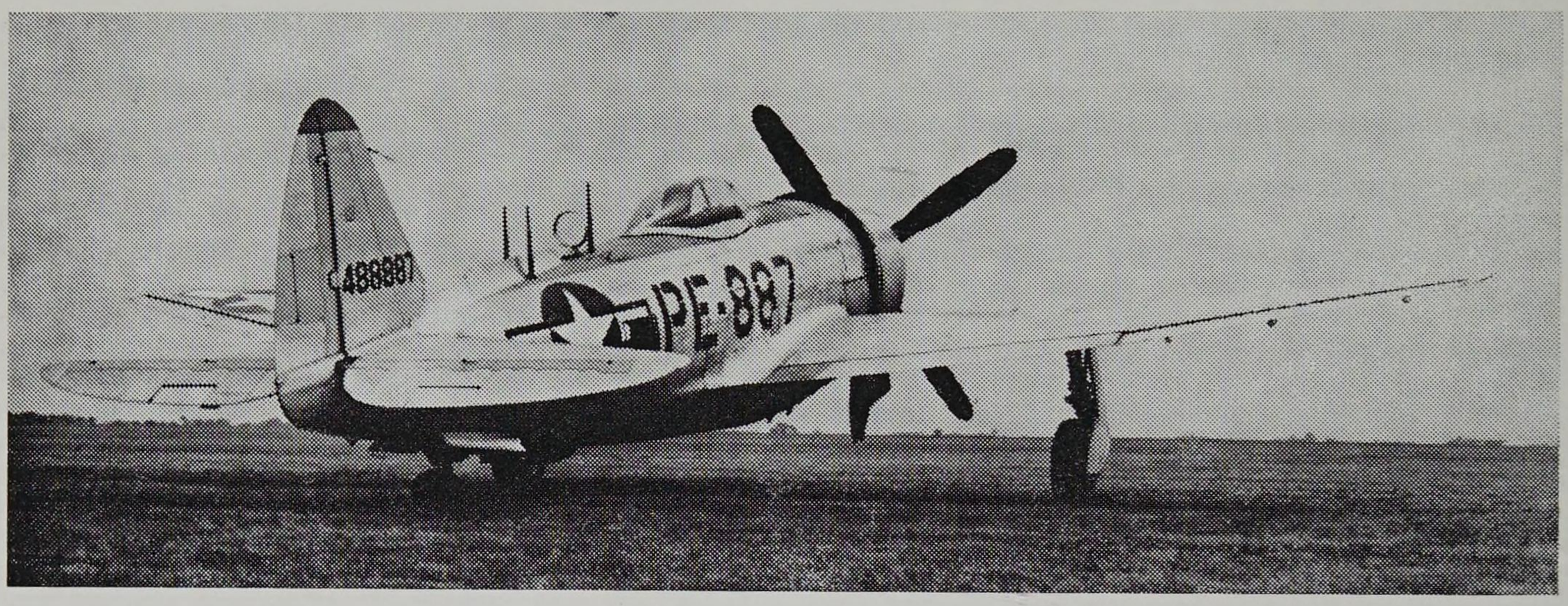


Reliable Combination

The P-47N proved an extremely reliable combination of airframe and engine that gave pilots confidence on the long, over-water flights. It was undoubtedly more hardy than the nimble Mustang and had the war in the Pacific continued further fighter groups would have been redeployed to the Pacific and equipped with the type. The one real shortcoming was the long take-off run needed to get the fully loaded heavyweight airborne. The runways on Ie Shima and Iwo Jima were over a mile-and-a-half long yet pilots deemed it necessary to select high power settings to get their charges moving at very high speeds prior to lift off. Failure had unpleasant prospects as the rocky surface of these islands was far from ideal

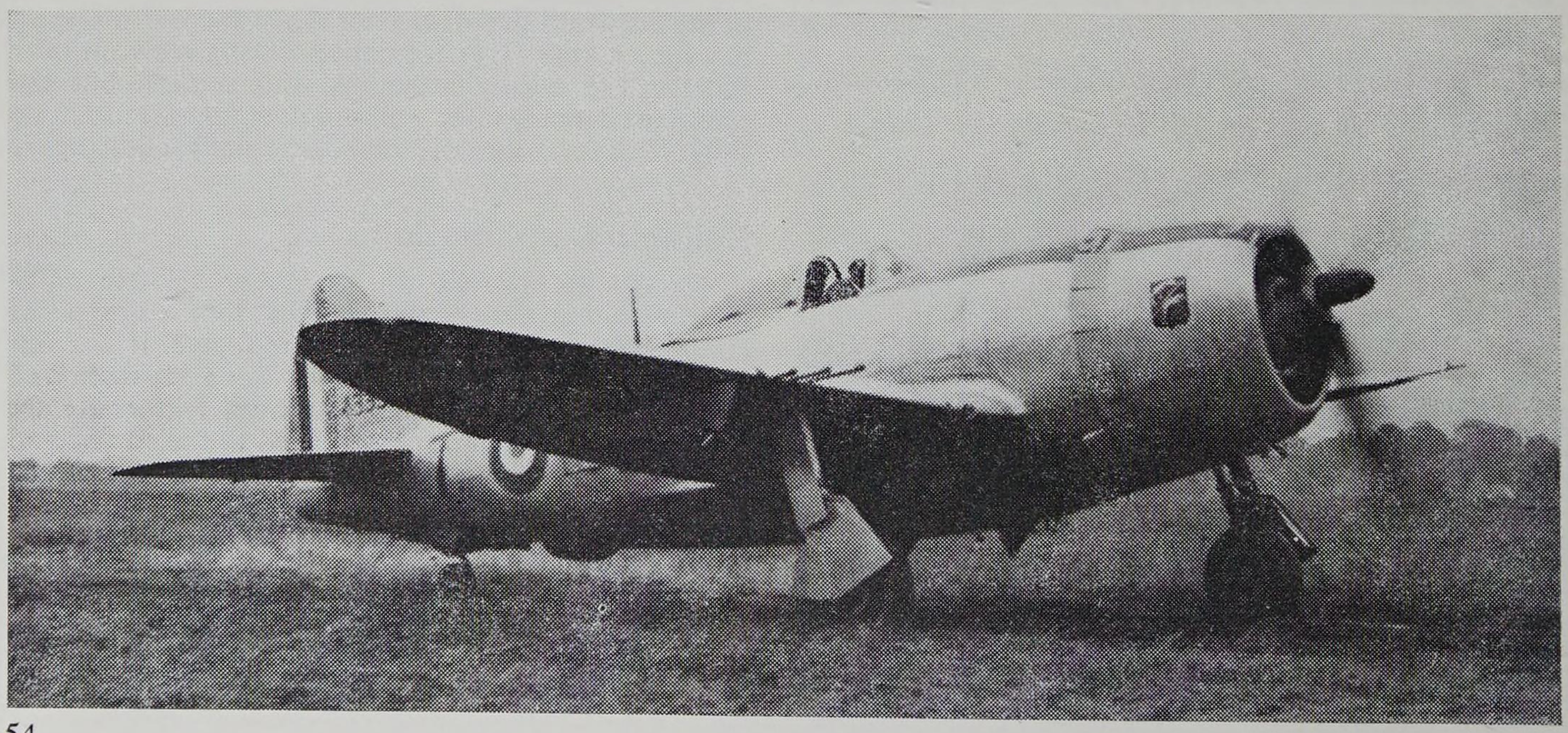


Last Fighter Group in the regular U.S.A.F. to operate Thunderbolts was the 86th, based at Neubiberg, Germany. This is an aircraft of 526th Fighter Squadron, seen on a visit to England shortly before the unit converted to F-84 jets in 1950. (Photo: A. Pearcy)



A P-47N-15-RE of the post-war U.S.A.A.F. A D/F aerial has been installed. (Photo: Hal Martin)

The French operated some 60 Thunderbolts in Europe and North Africa until the early 1950's. (Photo: C. W. Cain)



for belly landings or run-overs, and beyond lay the sea. It was said that a visiting representative of the manufacturers considered too much fuel was being wasted on take-off through the selection of too high manifold boost. He explained that optimum settings had been worked out in the U.S. for P-47s with full loads and to prove that these were quite sufficient he prepared to demonstrate. The Thunderbolt began its roll down the runway gathering speed far too slowly in the view of the onlookers. Eventually, the tail left the ground but still speed appeared insufficient. At the end of the runway the pilot attempted to lift the aircraft off but it had not attained flying speed and crashed into the rocks ahead. The Company needed a new representative and the unit concerned a new P-47N.

END OF THE LINE

PRODUCTION of the Thunderbolt was terminated in the autumn of 1945 with the cancellation of contracts for nearly 6,000 P-47Ns. Evansville delivered its final aircraft in September and although the Farmingdale lines stopped in October, a few aircraft were not actually turned over to the U.S.A.A.F. until the end of the year.

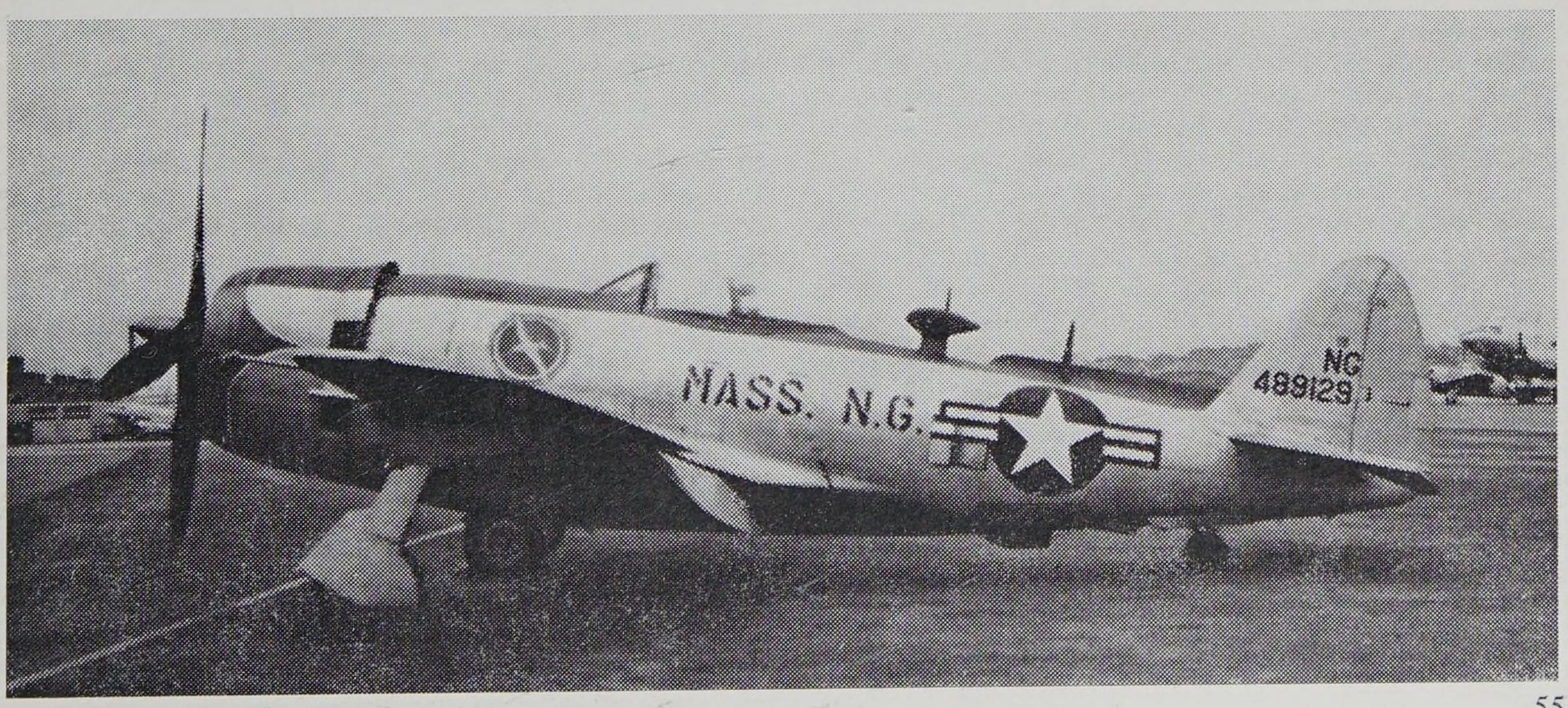
When hostilities ceased in Europe there were over 3,000 Thunderbolts at stations in Germany, France, Italy and the United Kingdom. Many were brand new replacements with only a few hours on them and these were flown to Speke near Liverpool, England to be dissembled and prepared for shipment to the U.S.A. and the Pacific theatre. Among the first to go were five P-47N-5-REs, which had originally been destined for the 56th Group but got no further than a modification depot before the war ended. The majority, however, were P-47D-30 and 40-RAs earmarked for the tactical air forces on the continent. Many aircraft in squadron service were later moved to Speke and sent home but a vast number were never to leave Europe. Several of the original P-47Cs, the first P-47s in action were still flying in Europe for training purposes and these were broken-up for scrap. In Germany where the great majority of Thunderbolts finished up, several airfields, including Kassel, became collection stations and row upon row of Thunderbolts stood waiting for the breaker's bar, the many different unit markings making a colourful picture.

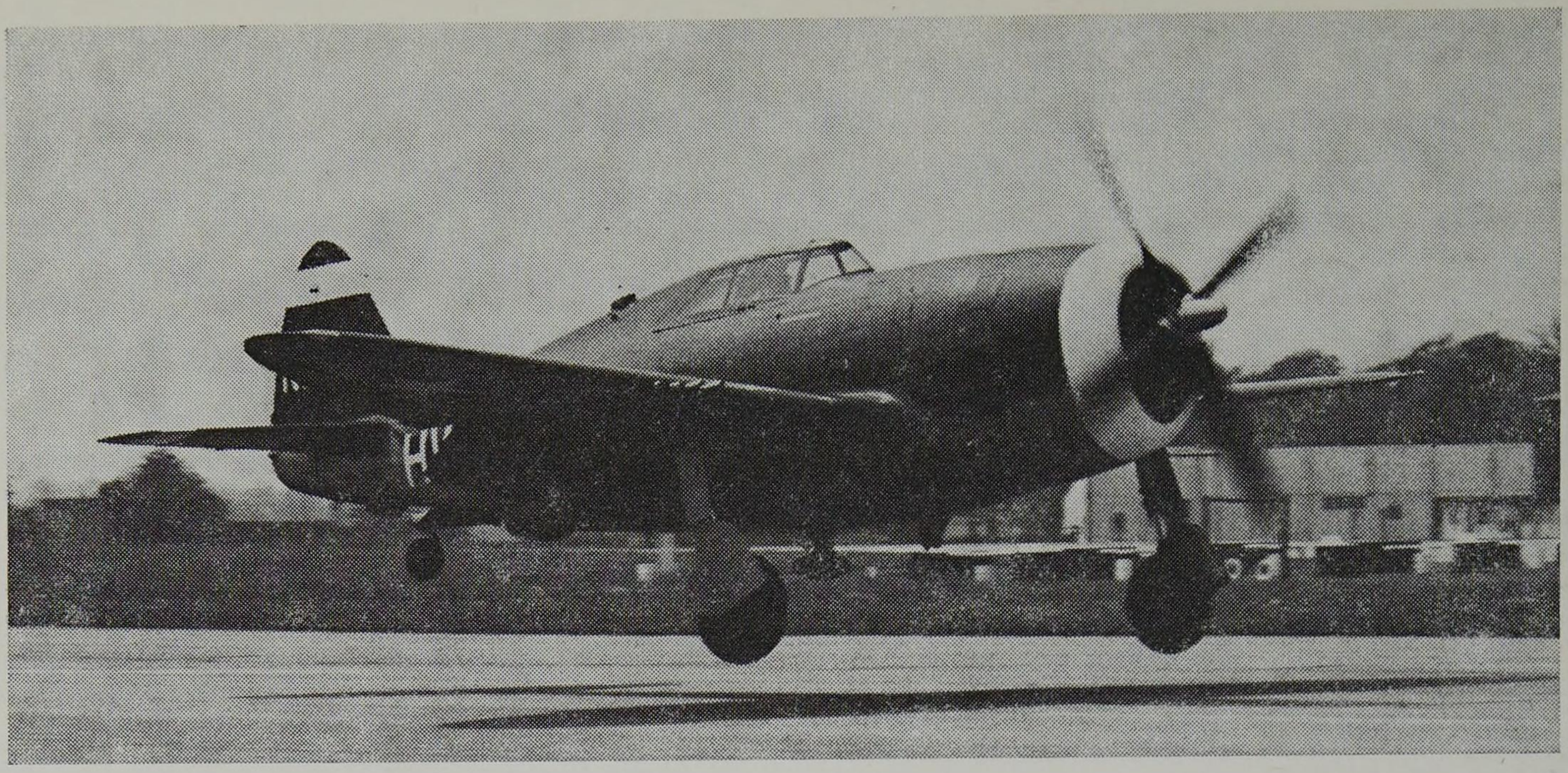
Some Thunderbolts went to a replacement pool for the six P-47D equipped fighter groups that remained in Germany as part of the occupational forces. Drawn from the 9th and 12th Air Forces, these were the 36th, 79th, 86th, 366th, 368th and 406th Groups. They did not, however, endure long. By February 1946, the 36th and 86th were so depleted of personnel that they were wound up. In August the same year changes of designation took place and the 366th, 368th and 406th became the 27th, 78th and 86th respectively. By the following June all but the 86th Group had ceased to exist in Germany and the last P-47s operated by the U.S.A.A.F. in Europe were with this unit at Nordholz.

At the time of Japan's surrender about 1,400 Thunderbolts both first and second line were with units engaged in that war, just over a thousand being with the air forces on the island chains surrounding Japan. As in Europe, some aircraft were scrapped, others sent home, and the remainder stored or serving with the occupational groups, the 58th and 413th, while the 414th moved to the Philippines. Also, these units like their European counterparts, did not endure long and were inactivated during 1946.

There was another way of disposing of surplus military aircraft, selling them to nations with no aircraft industry of their own—or one unable to provide modern military designs. In the immediate post-war years several nations availed themselves of the comparatively bargain rate offers of U.S. warplanes and the Thunderbolt was a popular choice. The Republic of China formed its 11th Fighter Group into a P-47D equipped unit, using many of the aircraft from the U.S.A.A.F.'s inactivated units in the western Pacific and south-east Asia areas. From Europe Thunderbolts were sold to Italy, Turkey, Iran, Portugal and Yugoslavia, while France whose

Several Air National Guard squadrons used Thunderbolts during the decade following World War II. This 'N' with D/F aerial was assigned to the 101st Fighter Squadron. (Photo: D. Menard)





Republic's rejuvenated P-47D, 42-23278 landing at Biggin Hill, England, in 1963. A D/F aerial was fitted to the underside of its fuselage. (Photo: Republic)

units with the 1st Tactical Air Force had been flying P-47Ds received 131 shortly after VE day. These were used by 3rd and 4th Escadre de Chasse, with an establishment of 32 aircraft each. The largest interest in Thunderbolts was shown by the central and south American nations, Bolivia, Chile, Colombia, Dominica, Ecuador, Honduras, Nicaragua and Venezuela, all acquiring P-47s during the decade following the war while Mexico and Brazil retained the type in their air forces. Many of these remained in service through two decades. The last were probably those few remaining with the Peruvian Air Force which were retired in 1969. The Thunderbolt's guns were not stilled for long after World War II and in addition to the R.A.F.'s operations over Indonesia, the French in Algeria and the Nationalist Chinese also used them in anger. Possibly the last offensive sorties were during the Dominican troubles of 1964.

In the United States P-47s remained with a few regular air force fighter groups during 1946 and 1947 chiefly the re-organised 56th at Selfridge, Michigan, and the 14th at Dow, Maine. The jet age had arrived and by the end of 1948 few active P-47s remained on the inventory of the regular Air Force. The reserve, notably the Air National Guard, a state territorial organisation, made use of the Thunderbolt in the eastern states. By 1950, it had 500 on hand of which 350 were in commission. The P-47 survived with the A.N.G. until 1952 when jet aircraft released by the U.S.A.A.F. were available to take their place.

The revived Bendix air races saw one Thunderbolt contestant, the first YP-47M stripped of all military equipment and entered by Bill Odom. This fastest of the conventional Thunderbolt models had good possibilities in competition with Mustangs and Corsairs but it seemed dogged with minor fuel troubles which prevented it from achieving any notable success. This particular aircraft later found its way to an aircraft dealer's yard in Oklahoma where it was cannibalised for parts for many years.

Of the 6,500 odd Thunderbolts that existed at the end of the World War 2 few remained by the early 1960s and in consequence what had been looked upon as war surplus and potential scrap gradually became an historic relic. Republic themselves were one of the first to draw attention to the scarcity of

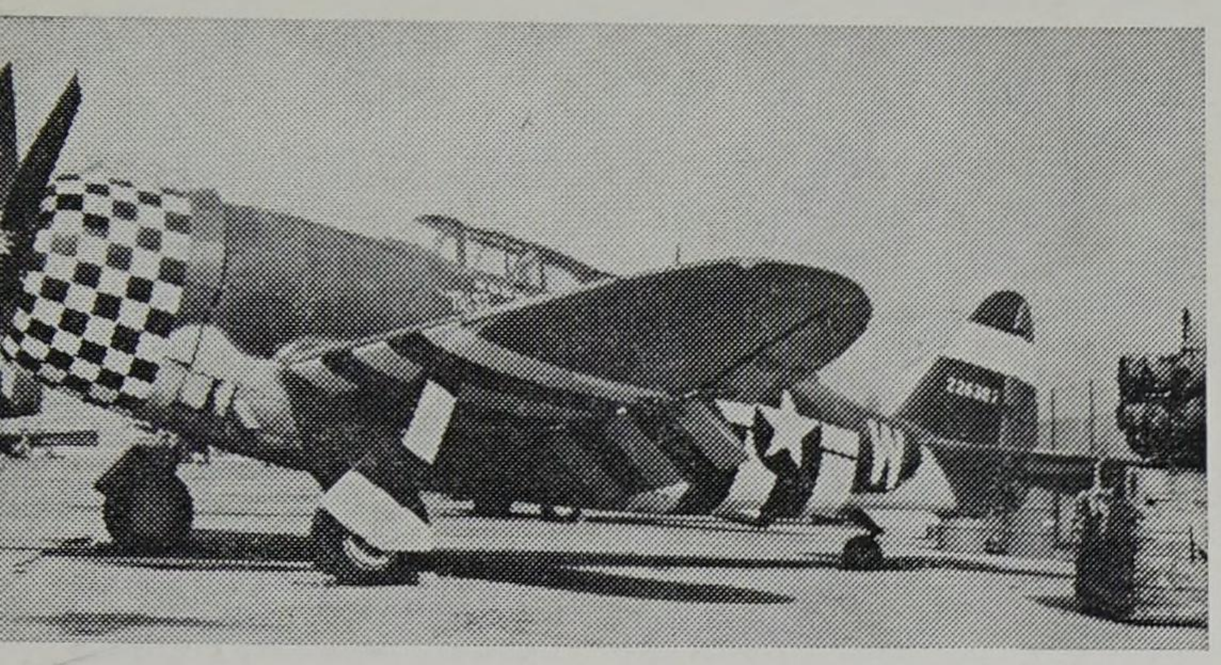
Glen Bach, the Republic test pilot who flew the Thunderbolt in Europe during 1963. Nose insignia combines national flags of the nations that used Thunderbolts during World War II. (Photo: Republic)

their once plentiful product. They decided to mark the 20th anniversary of the first flight of XP-47 with a reunion to which any former Thunderbolt pilot was invited to attend. Republic then looked round for a flyable example of the P-47, eventually locating a D model held by Bob Bean an aircraft dealer in California. This aircraft was flown back to Farmingdale and put through its paces before the 873 'Jug' pilots who turned up for the May 2, 1961 reunion.

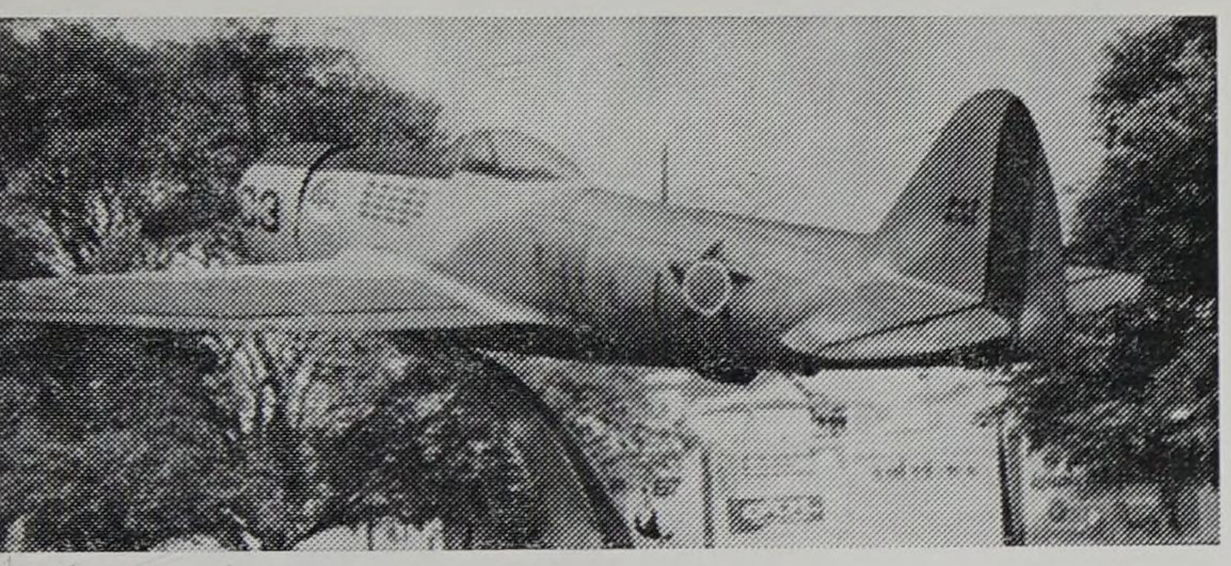
The nickname 'Jug' was a shortened form of Juggernaut, a sobriquet for the P-47 dreamed-up by sceptical pilots in the days when the aircraft looked anything but a fighter. Only after hostilities did 'Jug' grow in popularity as a familiar term for the P-47; wartime pilots usually referring to the aircraft by its true names or by the shortened 'T-bolt.'

Republic's P-47D was repainted with camouflage and markings similar to those carried by the wartime P-47D of ace Robert Johnson. The aircraft was in such good condition that it was decided to exhibit it at the 1963 Paris Salon, then the most influential aircraft manufacturers' show in the world. The P-47

was dismantled into major components, crated and shipped to St. Nazaire. On re-assembly it was flown not only at Paris but other air displays in France, Germany, Belgium and the U.K. Pilot was Glenn Bach, Republic's chief production test pilot on jets,



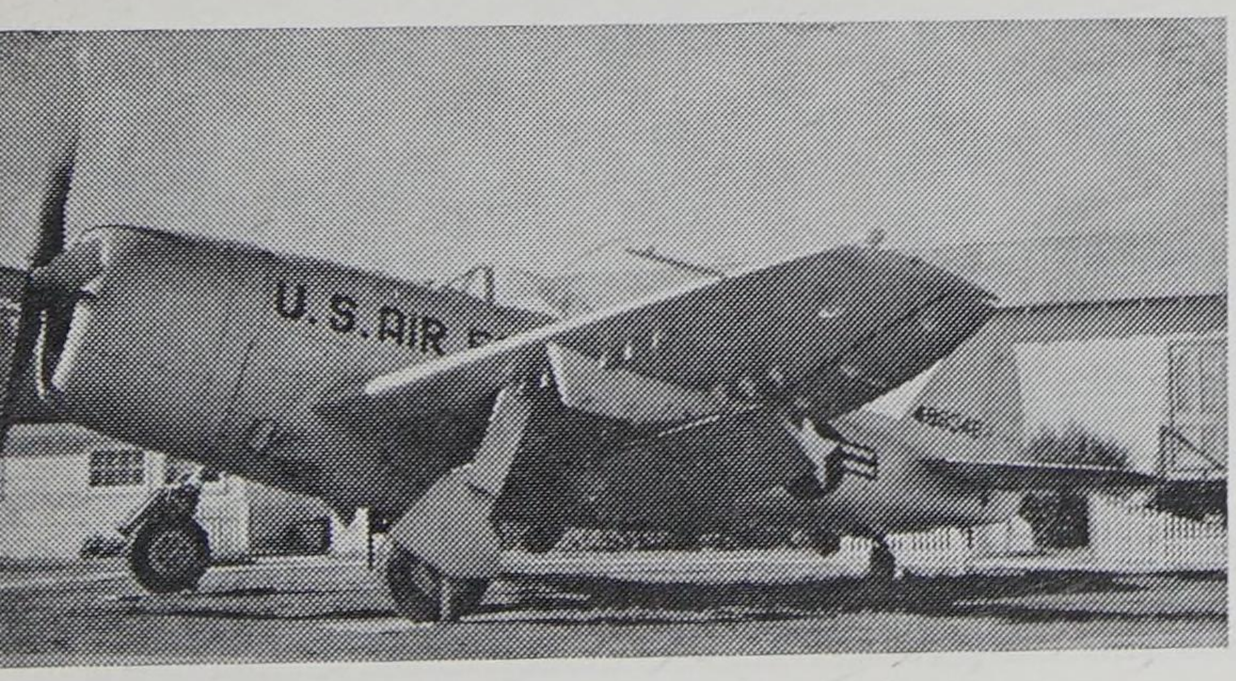
The P-47G owned by Ontario Air Museum, California, painted up in the colours of the old 78th Fighter Group, Eighth Air Force. (Photo: A. Pearcy)



The Brazilian Thunderbolt destroyed by student riots in 1969. (Photo: J. M. Davis)

Display P-47N at Perrin A.F.B., Texas. Aircraft formerly with Puerto Rico A.N.G. (Photo: N. E. Taylor)

P-47N used as a 'gate' decoration for many years at U.S.A.F's. Lackland base, in Texas. (Photo: D. Menard)



but no stranger to the Thunderbolt having flown one operationally with the 359th Fighter Group from East Wretham in the U.K. during the winter of 1943–44. Maintenance was in the hands of T. MacLaughlin, a Republic engineer who had worked at Farmingdale on P-47 maintenance problems during the production years.

After its demonstration flights in Europe the Thunderbolt was returned to Republic, overhauled and flown at displays in the U.S.A. In 1965 Republic donated the aircraft to the Air Force Museum, Dayton, Ohio where it was put on permanent static exhibition. Other static Thunderbolts, both N models, were parked outside the gates of Langley, Virginia and Lackland, Texas, Air Force Bases during the late sixties. The Smithsonian has a P-47D-30-RE in store while the Ontario Air Museum, California has a G model painted up in the colours of 56th ace Walker Mahurin's personal 'mount.' The YP-47M racer resided in the private air museum of Earl Reinert at Wheeling, Illinois during the late 1960s but in an incomplete state. The only other Thunderbolts known in the U.S. in 1970 were a P-47N from the Nicaraguan Air Force and two P-47Ds from the Peruvian Air Force which were acquired by the self-styled Confederate Air Force at Mercedes, Texas. These aircraft are regularly flown on a club basis and with the Ontario 'G' are probably the only airworthy examples left.

Exhilarating Memory

Abroad a lone P-47D resides in the Turkish Air Force Museum, and the French have preserved an example at Paris. The Brazilians erected one of their examples on a plinth in a Rio park. Left-wing students apparently objected to this American warplane, dormant as it was, and during riots in that city during 1969 the Thunderbolt was brought down in flames.

There are other physical remnants of the 15,683 Thunderbolts made between May 1941 and December 1945. A few are buried deep under English meadows. Some encrusted fragments still lie in the ocean bed, while other crumbling wrecks are overgrown in the rain soaked forests of New Guinea. The residue of the multitude still exists. But for most men who knew it the Thunderbolt is a memory; and an exhilarating memory at that, a wondrous military monster on the ground that once having gained its true element far above the earth became transformed into a fulminating missile, indeed the very realisation of its name, a thunderbolt.

Acknowledgments

A number of persons assisted in the preparation of this book by making available documents and photographs. Their help is most gratefully acknowledged: Norman Brown, Mike Bailey, Art Beltrone (Fairchild Hiller), Allan Blue, Ron Capewell, Frank Cheesman, Cass Hough, R. C. Jones, A. J. Knight, Dave Menard, Kenn Rust, Harold G. Martin and Bruce Rigelsford. Also, special thanks to the ever-helpful staff at the Imperial War Museum, N. E. Borden and Harvey Lippincott of Pratt & Whitney, Royal Frey at the U.S. Air Force Museum, Col. Holland and the Office of the U.S.A.A.F. Magazine and Book Branch, and the staff of the U.S.A.A.F.'s Pictorial Unit, in particular Virginia Finsic, for her kindness in making research facilities available to the author.

ENGINEERING AND PERFORMANCE DATA

Notes: Model and Block Number
Model designating letters were usually changed when: a new model engine was installed; a new model or type of propeller fitted; a major change in armament; or a major change in structure or equipment. In practice, this was not always the case and many such changes were only recognised by a new block number. Block numbers identify a group of aircraft incorporating the same modifications. These were supposedly to be assigned in multiples of five to production aircraft with intermediate numbers reserved for modifications made during service or at a modification centre. Again, this ruling was not adhered to in many instances.

Army Air Force Serials
The individual aircraft numbers assigned by the U.S.A.A.F. Stamped on a data plate in the cockpit; applied in small black characters to the left side of fuselage in close proximity to the cockpit; and in abbreviated form on the fin. Note: Some P-47s laid down as one model were completed as prototypes of another.

Engine
Model installed at factory unless otherwise stated.

Propeller
As installed at factory. Changes occurred during service.

Dimensions
Dimensions varied slightly between individual aircraft of the same model. Details are as from Republic or U.S.A.A.F. charts.

Weights
These also varied between individual aircraft of the same model and figures given are A.A.F. standards. Gross figure is aircraft with pilot, normal fuel and war load but devoid of external stores. Maximum weight is the recommended limit for fully-loaded aircraft with external stores.

Speeds
Maximum speed is that obtained with aircraft clean of all external stores and pylons, and at gross weight. In most cases these speeds were obtained by water injection (War Emergency power) and only sustained for between five and 15 minutes. All speeds varied with altitude and weight as well as between individual aircraft of the same model. The P-47 obtained its highest speeds around 30,000ft.

Climb
Expressed in the time taken to reach a specified altitude from ground level. Times given are for the aircraft clean and at gross weight.

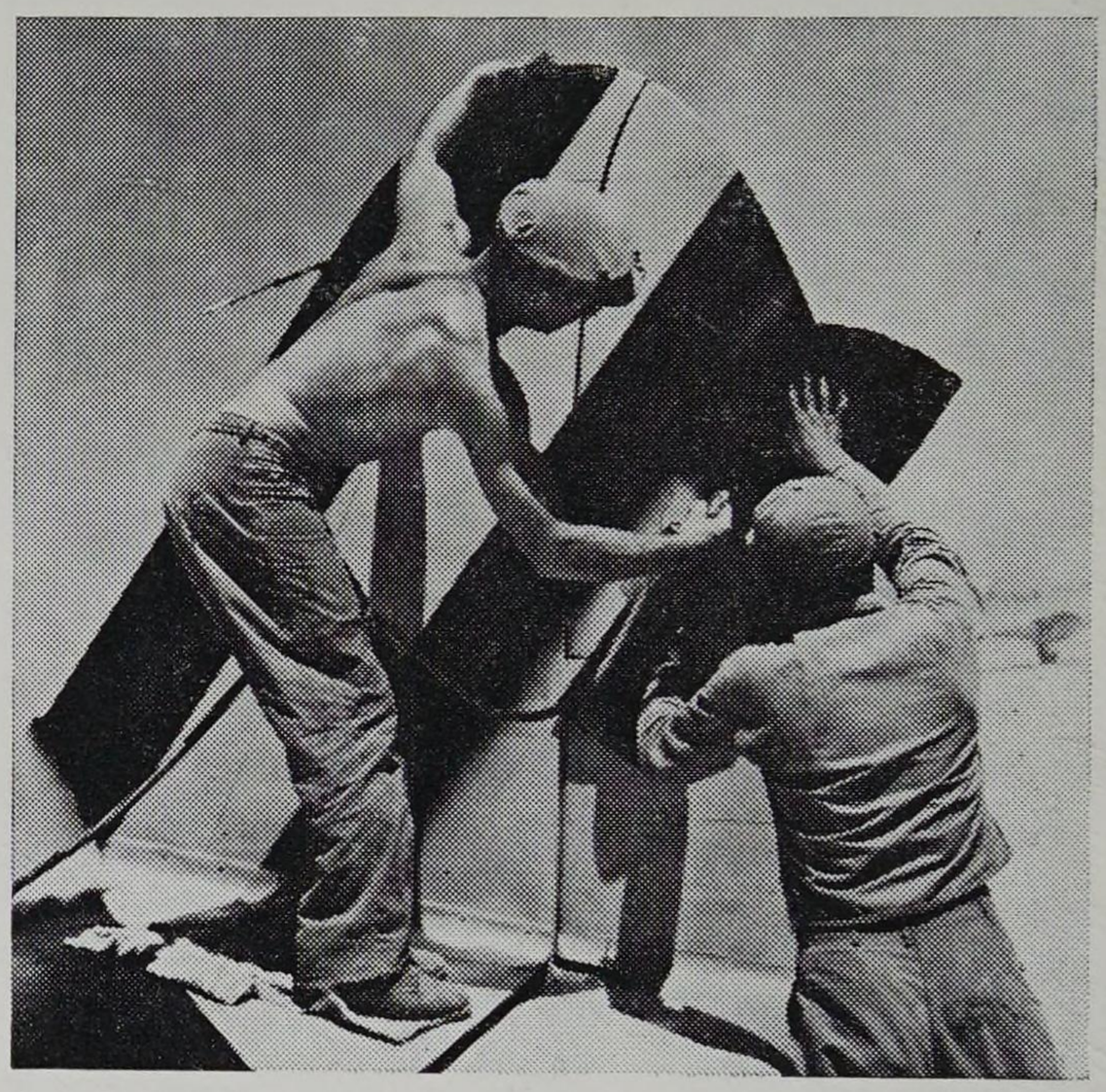
Service Ceiling
The point where rate of climb becomes 100ft. per minute. The practical limit for operational purposes.

Fuel
Internal, gives maximum built-in tankage. *External*, the maximum amount specified for drop tank loads.

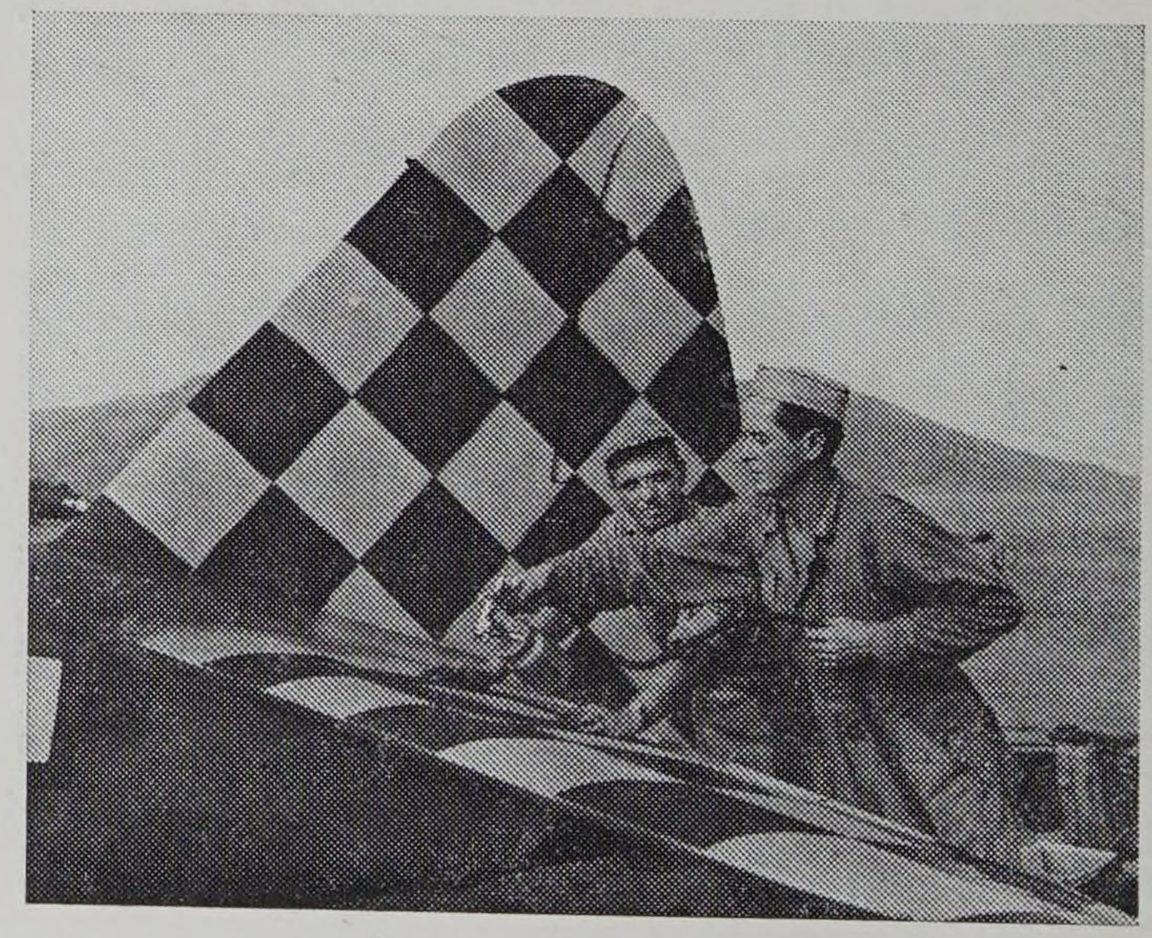
Range
Maximum gives that obtained at retarded power setting on internal fuel-stretching range to the limit. *Normal* is the usual distance obtained on internal fuel supplies at combat operating height and combat cruise speed. Range, however, varied enormously with weights, altitude and power settings.

Armament
Combat P-47s usually operated with all eight 0·50in. machine-guns installed. Ammunition was varied to meet the requirements of a particular mission. Figures given are those recommended by the A.A.F.

Changes
Changes made on the factory production line to bring about a new designation for a model. Changes at modification centres and at combat bases saw many



A.A.F. Thunderbolt units were noted for their colourful markings. Here yellow and black paint is being applied by mechanics of the 325th Fighter Group in Italy (checkerboard), and the 318th Fighter Group (stripes) on Ie Shima, Okinawa. (Photo: U.S.A.F.)



of the older Thunderbolts up-dated. Instances exist where two aircraft from the same factory block, and serving on the same station, had different engines, propellers and other components. One aircraft had been extensively modified to meet a combat standard while the other had been restricted to training flights.

Model: XP-47B. No. Built: One. A.A.F. Serial: 40-3051. Engine: R-2800-35 & R-2800-17, Rating 2,000h.p. Propeller: Curtiss Electric 12′ 2″ diameter. Dimensions: Span 40′ 9″, Length 35′ 0″, Height 12′ 8″, Wing area 300sq. ft. Weights: Empty 9,189lb., Gross 12,700lb. Speeds: Max. 412m.p.h. at 25,800ft, Landing 92m.p.h. Climb: 5min. to 15,000ft. Fuel: Internal 305 U.S. gal. Range: Max. 1,150 miles at 10,000ft., Normal 575 miles at 25,000ft. Armament: Provision for 8 ×0·50″ machine-guns (m.g.), with 500 rounds per gun (r.p.g.).

General Description

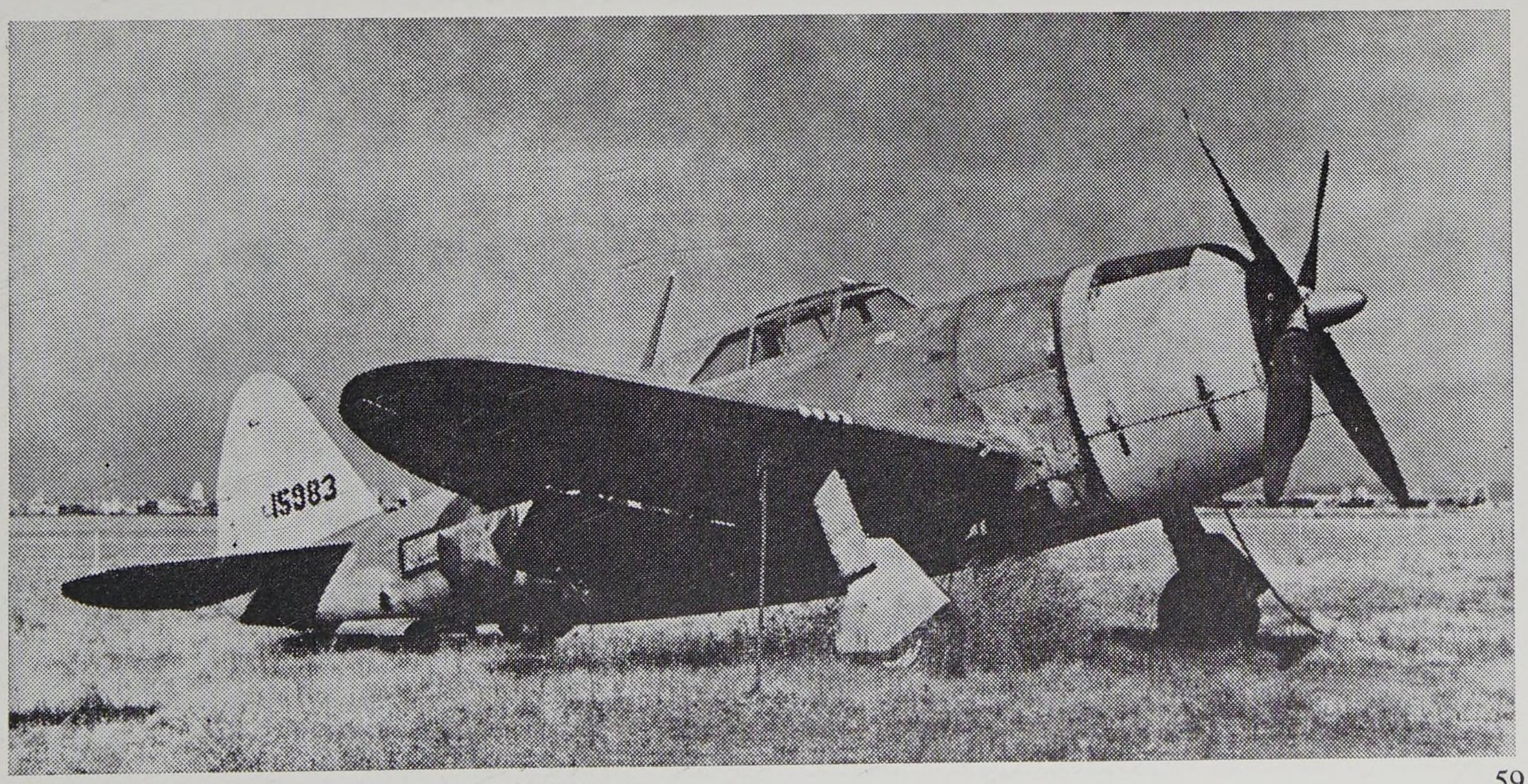
Fuselage and components. Semi-monococque, all-metal, stressed-skin construction, composed of transverse bulkheads and longitudinal stringers. Main, forward part of bulkhead/frame structure built in two units; top and bottom, bolted together. Aft section constructed as one complete unit and then assembled to forward sections. Front firewall bulkhead faced with stainless steel sheet. Engine attached by Lord mountings. NACA design type cowling formed by four quick-detachable panels fastened to support rings attached to engine valve rocker covers. Hydraulically-operated cowling ventilation flaps fitted at rear of secondary engine cowling. Accessories, compartment aft engine with four cooling vents. Main fuel tank, 205 U.S. gallons capacity situated forward and below cockpit between wing hinge bulkheads; 100 U.S. gallon auxiliary tank directly aft rear wing hinge support bulkhead. 28 U.S. gallon oil tank in accessory section. Oil cooling radiators with electrically-operated outlet doors mounted in primary air duct beneath engine. General Electric exhaust-driven turbo-supercharger approximately 21ft. aft of propeller, in lower fuselage. Exhaust gases ducted to turbo through insulated pipes, one each side of lower fuselage. Exhaust gases released through waste gate (butterfly valve) housed in stainless steel hood under rear fuselage. Small waste gates at rear of engine for discharge of exhaust when not required for turbo power. Air for supercharging reaches turbo through long duct from lower engine cowl. After supercharging, air passes through intercooler prior to being piped back along either side of fuselage to single carburettor intake. Air for intercooling obtained from central duct and released on both sides of fuselage via electrically-operated doors, which also affect temperature control.

Radio situated directly aft cockpit. Oxygen supply bottles mounted in upper compartment directly behind radio. Fully retracting tail wheel with enclosing doors. Access to cockpit via forward hinged door in left-side fuselage. Face-hardened armour plate $\frac{3}{8}$″ thick aft pilot's seat. Windshield of $1\frac{1}{2}$″ armoured glass.

Wings and associated components. Full cantilever type employing two main spars supporting attachment of wing to fuselage. Three secondary spars, one each supporting aileron, flap and undercarriage assemblies. Republic S-3 airfoil sections form multicellular structure with spars. Flush-riveted, stressed-skin surfaces reinforced by extruded angle stringers. Ailerons represent approximately 11·4% of total projected wing area. Fabric covered with push-pull rod system control. Controllable trim tab on left wing only. Landing flaps total 13% of projected wing area: N.A.C.A. slotted trailing edge type, hydraulically-operated. Wing root chord of $109\frac{1}{2}$″; mean aerodynamic chord of 87·46″; 5·61 aspect ratio; angle of incidence +1°; top surface dihedral of 4″; leading-edge sweep-back 3°. Gun bays situated outboard of undercarriage well and actuating gear. Staggered arrangement for machine-guns allowing ammunition feed troughs to be arranged side by side in outer wing panels.

Empennage. Full cantilever structure. Total projected area: 81·45sq. ft. Fin and horizontal stabiliser cellular structure of flanged ribs secured to fore and aft spars in each plane. Whole unit bolted together and, in turn, bolted to rear fuselage brackets. Rudder and elevators of Handley Page type, fabric covered.

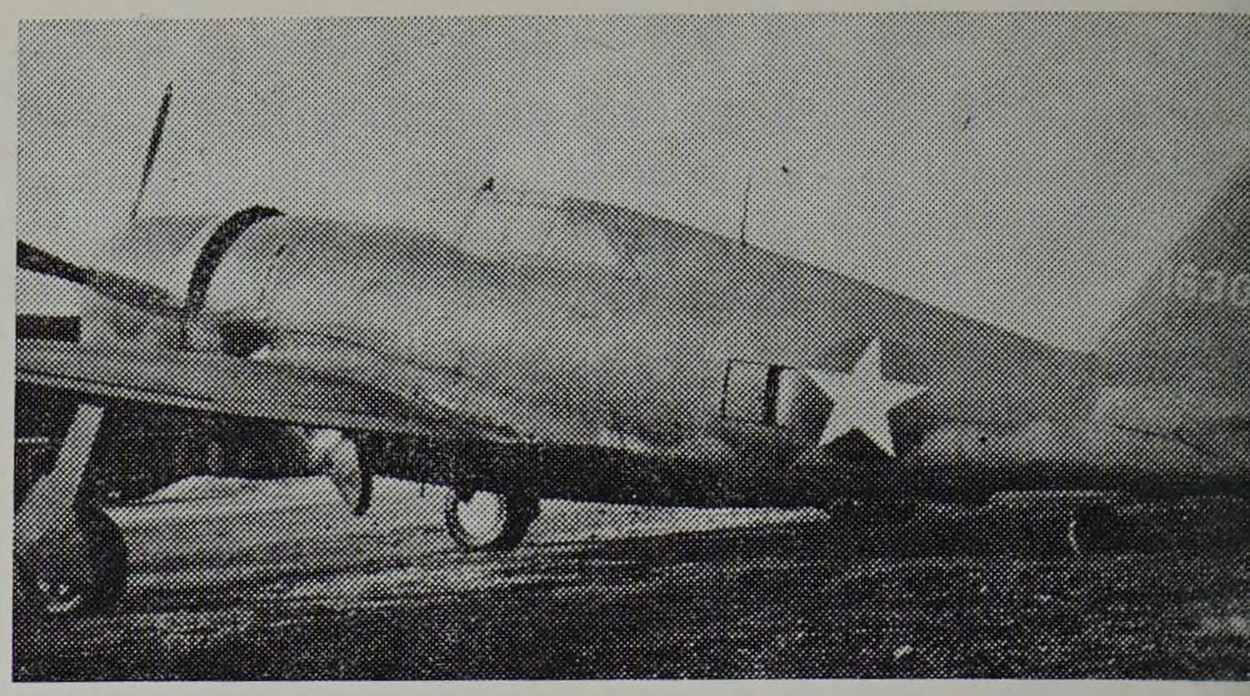
RP-47B retired from training duties (Photo: Hal Martin)



Remarks
XP-47B completed May 2, 1941. First flight May 6, 1941. Destroyed in crash August 8, 1942. Extensively modified during trials.

Model & Block No.: P-47B. No. Built: 171. A.A.F. Serials: 41-5895 to 41-6065. Engine: R-2800-21, Rating 2,000h.p. Propeller: Curtiss Electric, 12′ 2″ diameter. Dimensions: Span 40′ 9″, Length 35′ 0″, Height 14′ 2″, Wing area 300 sq.ft. Weights: Empty 9,346lb., Gross 12,245lb., Max. 13,360lb. Speeds: Max. 429m.p.h. at 27,800ft., Landing 100m.p.h. Climb: 6·7min. to 15,000ft. Service Ceiling: 42,000ft. Fuel: Internal 305gal. Range: Max. 835 miles at 10,000ft., Normal 550 miles at 25,000ft. Armament: 6 or 8×0·50″ m.g. with 500r.p.g. Changes: General-Electric A-13 turbo-supercharger regulator. Redesigned aerial mast. Radio. Heightened pilot seat snd cabin. Sliding cockpit canopy. New engine. Metal-covered ailerons. Remarks: First machine completed March 4, 1942. 41-6065 taken from line and completed as XP-47E 41-5938 after completion rebuilt as XP-47F. Designation of P-47B changed to RP-47B (restricted) in 1944. P-47B extensively modified in service. Flight limitations on those aircraft that retained fabric covered tail surfaces.

Model & Block No.: P-47C-1-RE. No. Built: 112. A.A.F. Serials: 41-6066 to 41-6177. Engine: R-2800-21 Rating 2,000h.p. Propeller: Curtiss Electric, 12′ 2″ diameter. Dimensions: Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 9,900lb., Gross 13,500lb., Max. 14,925lb. Speeds: Max. 420m.p.h. at 30,000ft., Landing 104m.p.h. Climb: 7·2min. to 15,000ft., 15min. to 25,000ft., 20min. to 30,000ft. Fuel: Internal 305gal., External 200gal. Range: Max. 835 miles at 10,000ft., Normal 400 miles at 25,000ft. (1·3hrs.). Armament: 6 or 8×0·50″m.g. with from 300 to 425r.p.g. Service Ceiling: 42,000ft. Changes: Four-point suspension shackles for 200gal. fuel tank (ferry). Hydraulic flap equaliser. Revised oxygen system with additional bottle in leading-edge root of left wing. A-17 turbo-supercharger regulator. New engine mountings giving



The first P-47C-5-RE. (Photo: U.S.A.A.F.)

13s extension of nose. Alterations to layout of engine accessory section: only three vents in fuselage. Balance weights in elevator control system. Redesigned radio mast and radio changes. Remarks: First aircraft completed September 14, 1942.

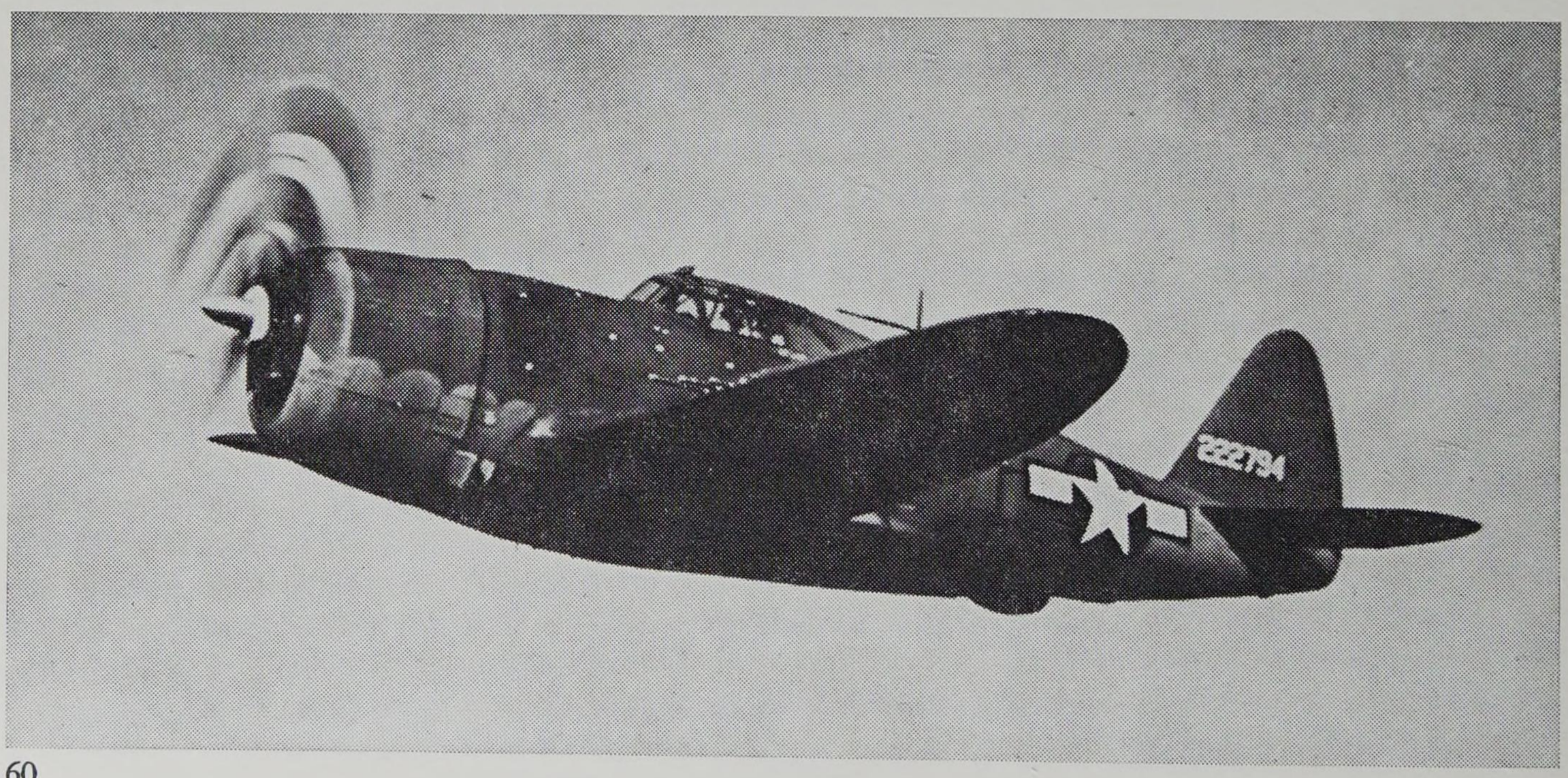
Model & Block No.: P-47C-2-RE. No. Built: 128. A.A.F. Serials: 41-6078 to 41-6305. Engine: R-2800-21 Rating 2,000h.p. Other data similar to P-47C-1-RE. Changes: Metal covered rudder and elevators.

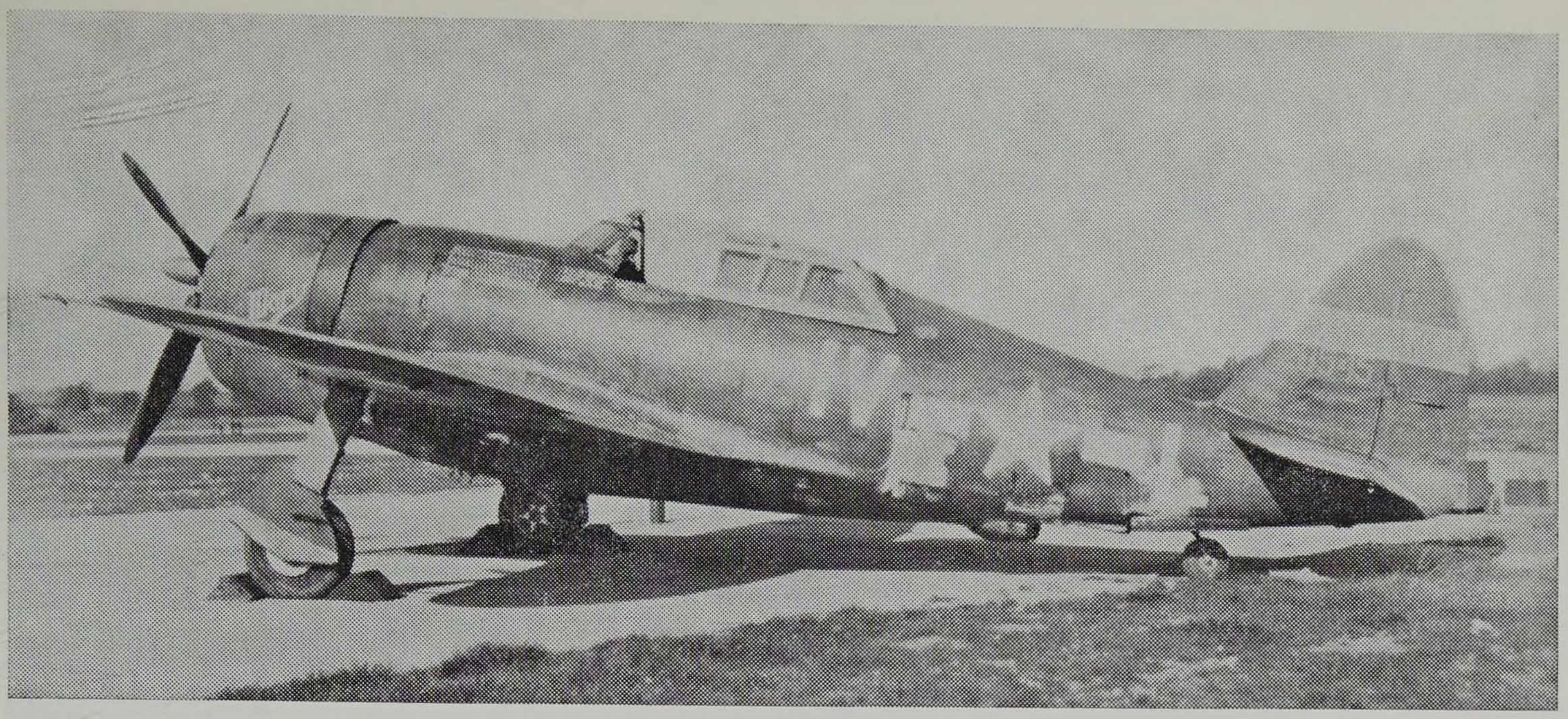
Model & Block No.: P-47C-5-RE. No. Built: 362. A.A.F. Serials: 41-6306 to 41-6667. Engine:R-2800-21 Rating 2,000h.p. Other data similar to P-47C-1-RE. Changes: Radio and aerial.

Model & Block No.: P-47D-RA. No. Built: 114. A.A.F. Serials: 42-22250 to 42-22363. Engine: R-2800-21,Rating 2,000h.p. Other data similar to P-47C-1-RE. Changes: First production from Republic Aviation plant at Evansville, Indiana, December 1942. Similar to P-47C-5-RE.

Model & Block No.: P-47D-1-RE. No. Built: 105. A.A.F. Serials: 42-7853 to 42-7957. Engine: R-2800-21, Rating 2,000h.p. Propeller: Curtiss Electric 12′ 2″ diameter. Dimensions: Span 40′ 9″, Length

P-47D-4-RA showing lower fuselage bump housing shackle actuating mechanism. (Photo: Republic)





P-47D-5-RE of green nosed 359th Fighter Group. (Photo: Air Force Museum)

36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 9,900lb., Gross 13,500lb., Max. 15,000lb. Speeds: Max. 420m.p.h. at 30,000ft., Landing 104m.p.h. Climb: 7·2min. to 15,000ft., 11min. to 20,000 ft., 15min. to 25,000ft., 20min. to 30,000ft. Service Ceiling: 42,000ft. Fuel: Internal 305gal., External 200gal. Range: Max. 835 miles at 10,000ft. (3·8hrs.), Normal 400 miles at 25,000ft. (1·3hrs.). Armament: 6×0·50″m.g. with 300r.p.g. or 8×0·50″ m.g. with 425r.p.g. Changes: Additional cowl flaps to improve cooling flow. Accessory compartment changes. Additional pilot armour in cockpit. Radio and aerial. Fuel system improvements. Oxygen operation.

Model & Block No.: P-47D-2-RA. No. Built: 200. A.A.F. Serials: 42-22364 to 42-22563. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47D-1-RE. Remarks: Evansville, Indiana. Changes similar to P-47D-1-RE.

Model & Block No.: P-47D-2-RE. No. Built: 445. A.A.F. Serials: 42-7958 to 42-8402. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47D-1-RE. Changes: Revision to fuel system.

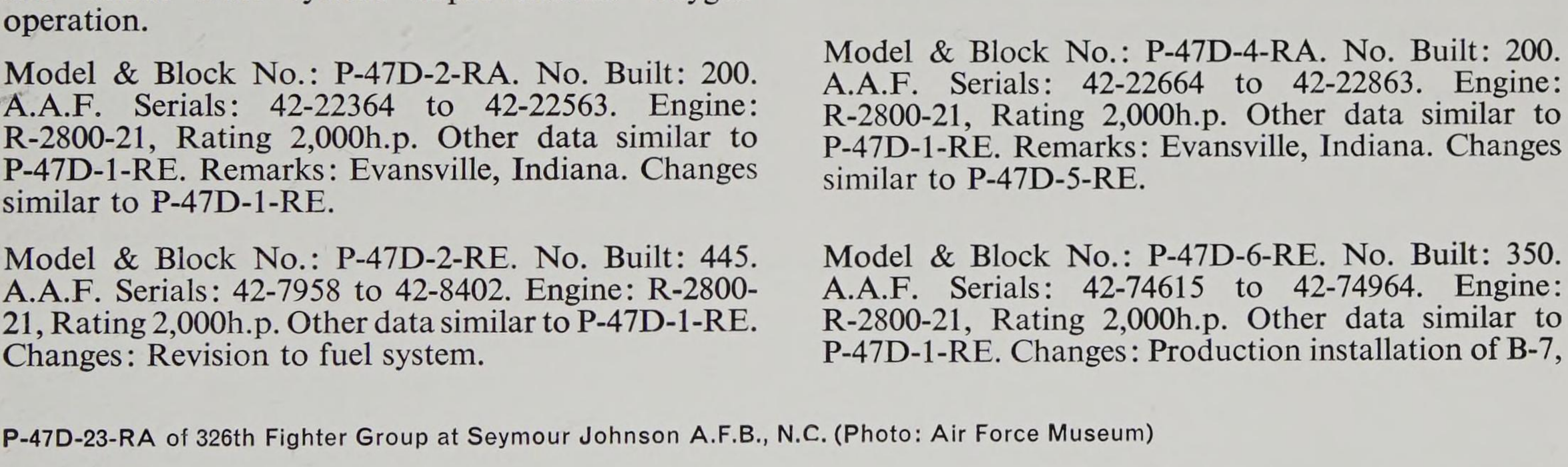
Model & Block No.: P-47D-3-RA. No. Built: 100. A.A.F. Serials: 42-22564 to 42-22663. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47D-1-RE. Remarks: Evansville, Indiana. Changes similar to P-47D-2-RE.

Model & Block No.: P-47D-5-RE. No. Built: 300*. A.A.F. Serials: 42-8403 to 42-8702*. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47D-1-RE. Changes: Oxygen operation. Simplified fuel system controls. Hydraulic system. Remarks: *42-8702, last aircraft on line, taken and completed as XP-47K.

Model & Block No.: P-47D-4-RA. No. Built: 200. A.A.F. Serials: 42-22664 to 42-22863. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47D-1-RE. Remarks: Evansville, Indiana. Changes similar to P-47D-5-RE.

Model & Block No.: P-47D-6-RE. No. Built: 350. A.A.F. Serials: 42-74615 to 42-74964. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47D-1-RE. Changes: Production installation of B-7,

P-47D-23-RA of 326th Fighter Group at Seymour Johnson A.F.B., N.C. (Photo: Air Force Museum)



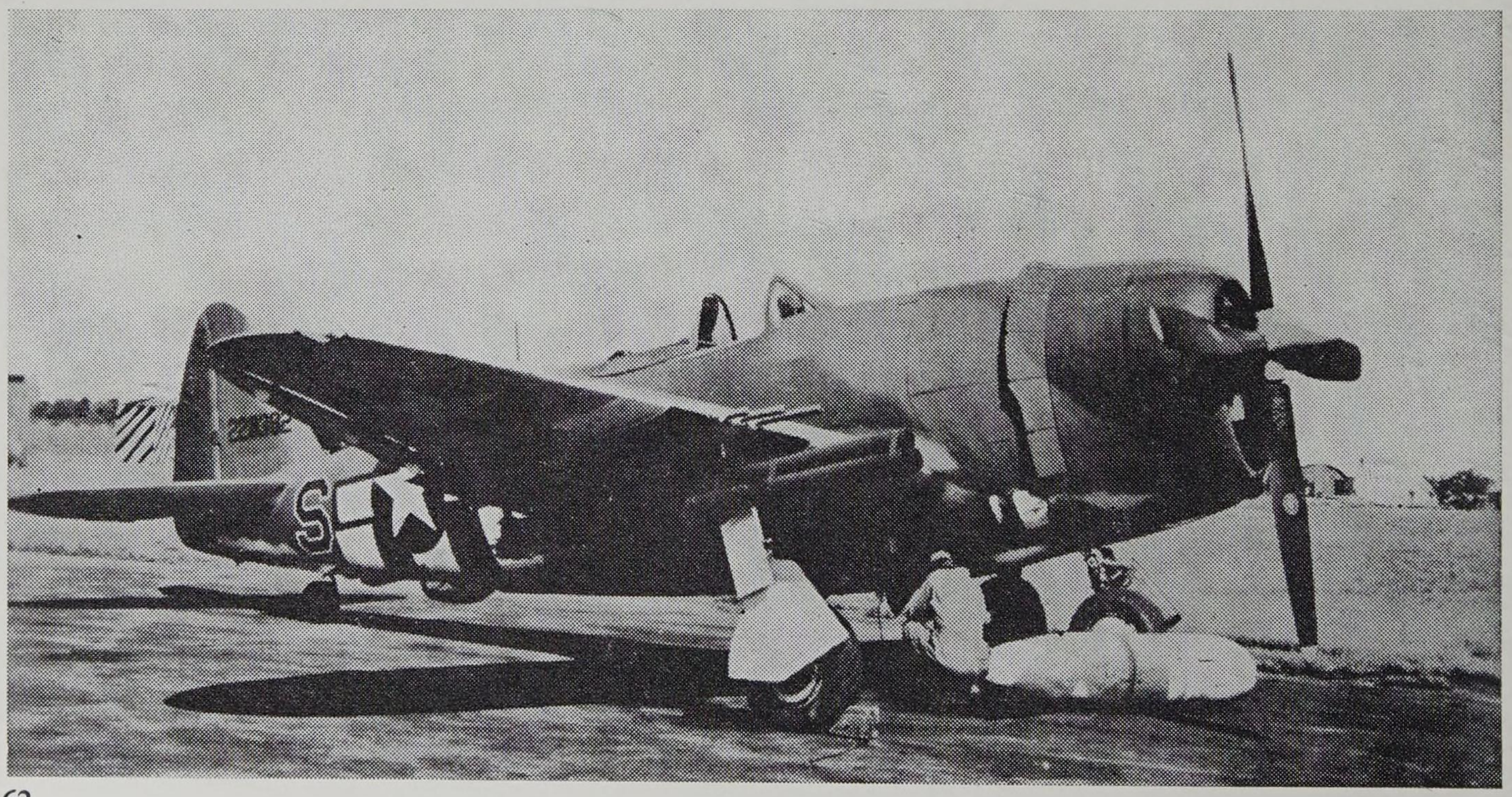
P-47D-25-RE of 347th Fighter Squadron, 350th Fighter Group. Squadron emblem on nose, Squadron identification mark on tail, group identification markings on fuselage: squadron, flight and aircraft number in flight. (Photo: S. Staples via R. C. Jones)

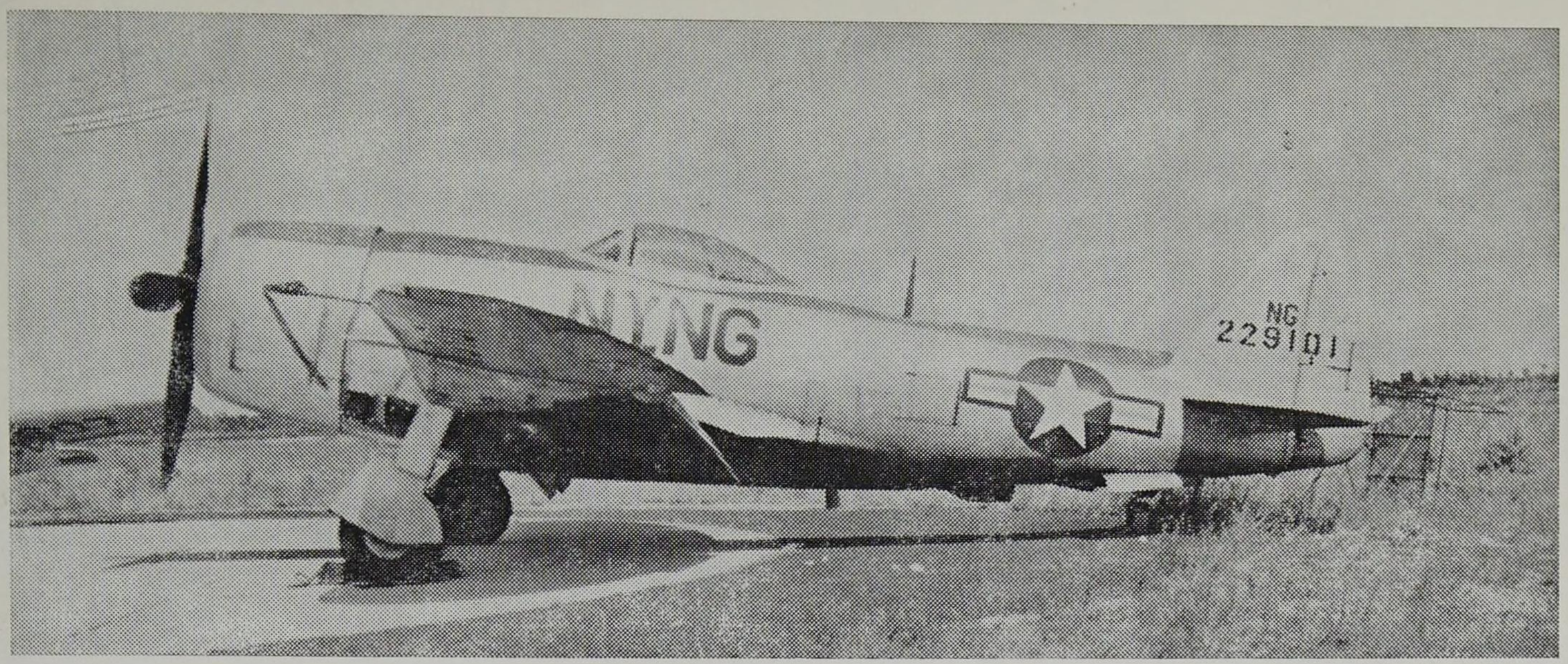
two-point shackles for one bomb or drop tank to be carried under the fuselage. Drop tank capacities: 75gal., 108gal., 110gal., 150gal., 165gal. and 200gal. One 500lb. bomb (normal).

Model & Block No.: P-47D-10-RE. No. Built: 250. A.A.F. Serials: 42-74965 to 42-75214. Engine: R-2800-21, Rating 2,000h.p. Other data as P-47D-1-RE. Changes: Hydraulic system. Flap hydraulics and controls. C-23 model of General Electric turbo-supercharger.

Model & Block No.: P-47D-11-RE. No. Built: 400. A.A.F. Serials: 42-75215 to 42-75614. Engine: R-2800-63, Rating 2,000/2,300h.p. Propeller: Curtiss Electric 12′ 2″ diameter. Dimensions: Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 9,900lb., Gross 13,500lb., Max. 15,000lb. Speeds: Max. 433m.p.h. at 30,000ft. Landing 104m.p.h. Climb: 7·2min. to 15,000ft., 11min. to 20,000ft., 15min. to 25,000ft., 20min. to 30,000ft. Service Ceiling: 42,000ft. Fuel: Internal 305gal., External 200gal. Range: Max. 835 miles at 10,000ft. (3·8hrs.), Normal 400 miles at 25,000ft. (1·3hrs.). Armament: 6 or 8 × 0·50″ machine-gun with from 267r.p.g. to 425r.p.g. Bombs: 1 × 500lb. (normal). Changes: Water injection on production engines. Designated as R-2800-63. 15gal. water/alcohol tank in

P-47D-26-RA of 61st Fighter Squadron, 56th Fighter Group, camouflaged in two shades of grey. (Photo: U.S.A.A.F.)





P-47D-28-RA of New York A.N.G. Dorsal fin has been added. (Photo: D. Menard)

accessories compartment. Operation automatically effected by throttle lever.

Model & Block No.: P-47D-11-RA. No. Built: 250. A.A.F. Serials: 42-22864 to 42-23113. Engine: R-2800-63, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Remarks: Evansville, Indiana version of P-47D-11-RE.

Model & Block No.: P-47D-15-RE. No. Built: 496. A.A.F. Serials: 42-75615 to 42-75864, 42-76119 to 42-76364. Engine: R-2800-63, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Changes: Production installation of wing pylons allowing a drop tank or bomb to be carried under each wing in addition to stores on the 'belly' shackles. Maximum external tankage increased to a total of 375gal. Fuel system changes to incorporate plumbing, etc., for tanks on wing pylons. Production use of vacuum pump for drop tank feed pressure. Bomb selection and load increased: 2×1,000lb.; or 3×500lb.; or other alternatives. Maximum bomb load: 2,500lb. Jettisonable canopy.

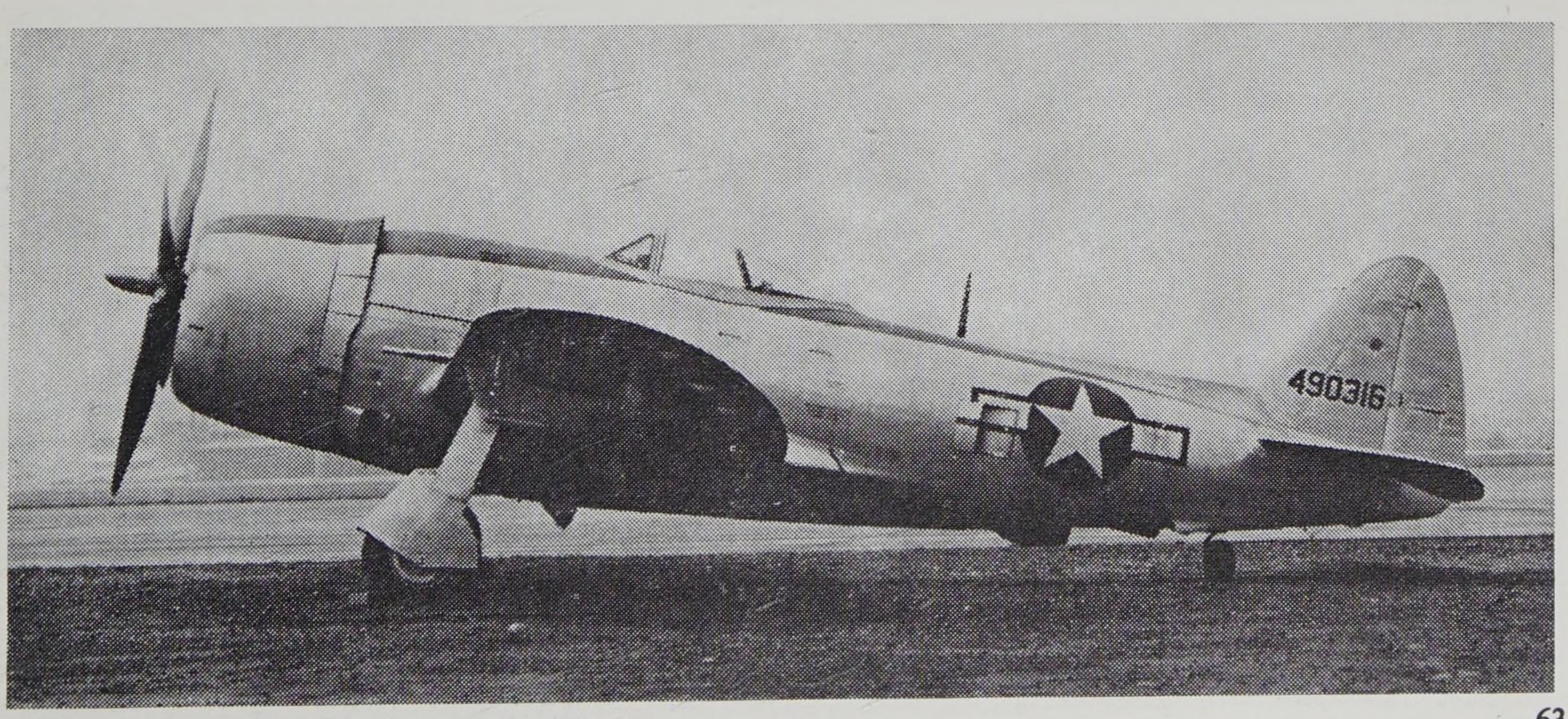
Model & Block No.: P-47D-15-RA. No. Built: 157*. A.A.F. Serials: 42-23143 to 42-23299*. Engine: R-2800-63, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Remarks: Evansville. Changes similar to P-47D-15-RE. *42-23297 and 42-23298 later modified to become XP-47Hs.

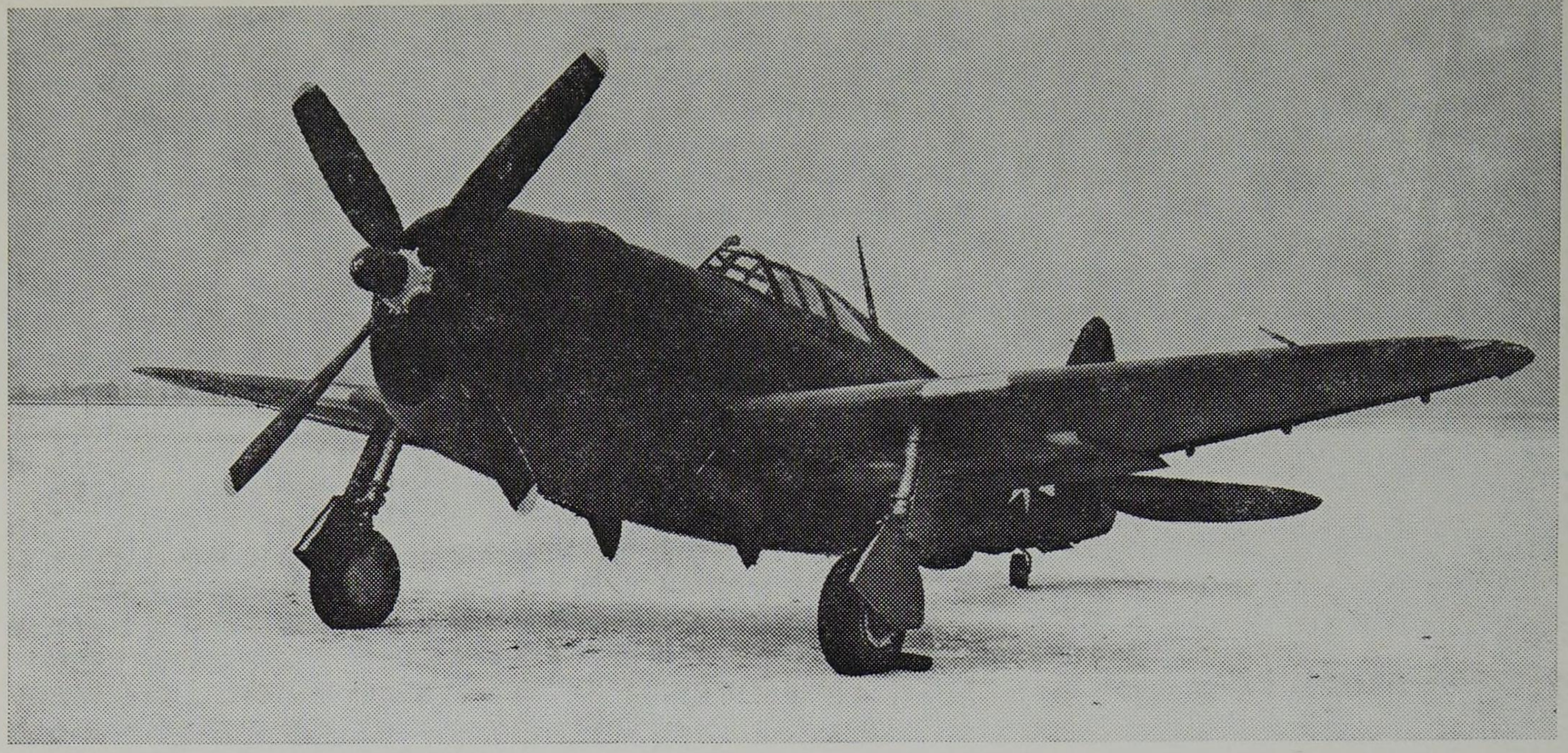
Model & Block No.: P-47D-16-RE. No. Built: 254. A.A.F. Serials: 42-75865 to 42-76118. Engine: R-2800-63, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Changes: Provision for use of 100/150 grade fuel.

Model & Block No.: P-47D-16-RA. No. Built: 29. A.A.F. Serials: 42-23114 to 42-23142. Engine: R-2800-63, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Remarks: Evansville. Changes similar to P-47D-16-RE.

Model & Block No.: P-47D-20-RE. No. Built 250*. A.A.F. Serials: 42-76365 to 42-76614*. Engine: R-2800-59, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Changes: Engine. R-2800-59, as -21 and -63 but including G.E. ignition system Longer tail wheel leg. Alterations in wing pylon tail. *42-76614 taken from line and completed as XP-47L.

P-47D-40-RA from Evansville. (Photo: Hal Martin)





XP-47E with new engine and paddle-blade propeller installed. (Photo: **U.S.A.F.**)

Model & Block No.: P-47D-20-RA. No. Built: 187. A.A.F. Serials: 43-25254 to 43-25440. Engine: R-2800-59, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Changes: Evansville. Changes similar to P-47D-20-RE.

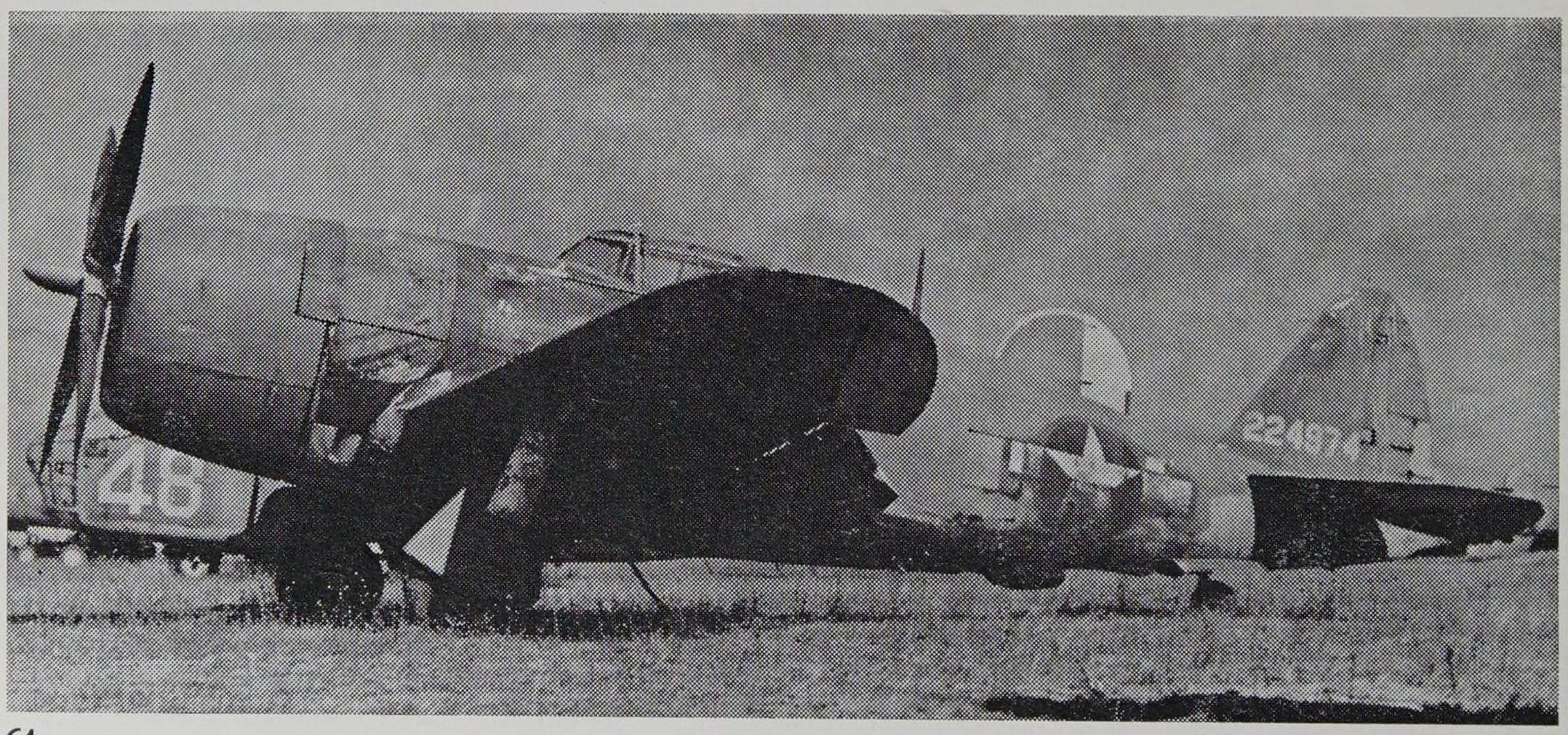
Model & Block No.: P-47D-21-RE. No. Built: 216. A.A.F. Serials: 42-25323 to 42-25538. Engine: R-2800-59, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Changes: Manual operation of water injection via button-switch on throttle lever. First natural metal finish aircraft in this block.

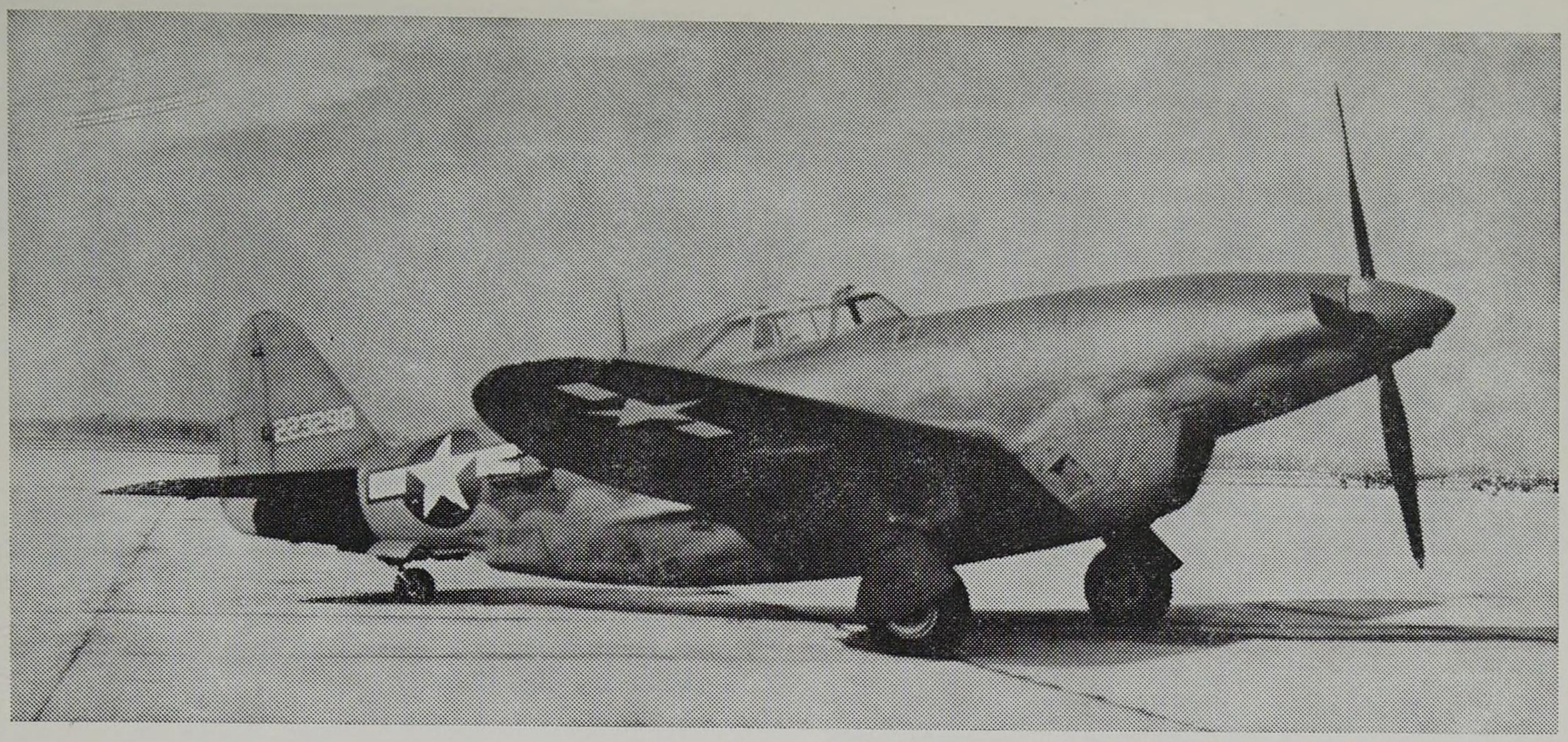
Model & Block No.: P-47D-21-RA. No. Built: 224. A.A.F. Serials: 43-25441 to 43-25664. Engine: R-2800-59, Rating 2,000/2,300h.p. Other data similar to P-47D-11-RE. Remarks: Evansville. Changes as P-47D-21-RE.

Model & Block No.: P-47D-22-RE. No. Built: 850. A.A.F. Serials: 42-25539 to 42-26388. Engine:R-2800-59, Rating 2,000/2,300h.p. Propeller: Hamilton Standard Hydromatic 13′ 1⅞″ diameter. Dimensions: Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 9,900lb., Gross 13,500lb., Max. 15,000lb. Speeds: Max. 435m.p.h. at 30,000ft., Landing speed 104m.p.h. Climb: 5·6min. to 15,000ft., 7·6min. to 20,000ft., 9·8min. to 25,000ft., 12·8min. to 30,000ft. Service Ceiling: 42,000ft. Fuel: Internal 305gal., External Max. 375gal. Range: Max. 835 miles at 10,000ft. (3·8hrs.), Normal 400 miles at 25,000ft. (1·3hrs.). Armament: 6 or 8×0·50″m.g. with from 267 to 425r.p.g., Bombs 2×1,000lb. or 3×500lb. or 3×250lb., etc. Max. load 2,500lb. Changes: Propeller change. Hamilton Standard Hydromatic 13ft. paddle-blade type. Different manufacturer. A-23 model turbo-regulator installed.

Model & Block No.: P-47D-23-RA. No. Built: 889. A.A.F. Serials: 43-25665 to 43-25753, 42-27389 to 42-28118. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller Curtiss Electric 13′ 0″ diameter. Dimensions:

P-47G-1-CU used for training. (Photo: Hal Martin)





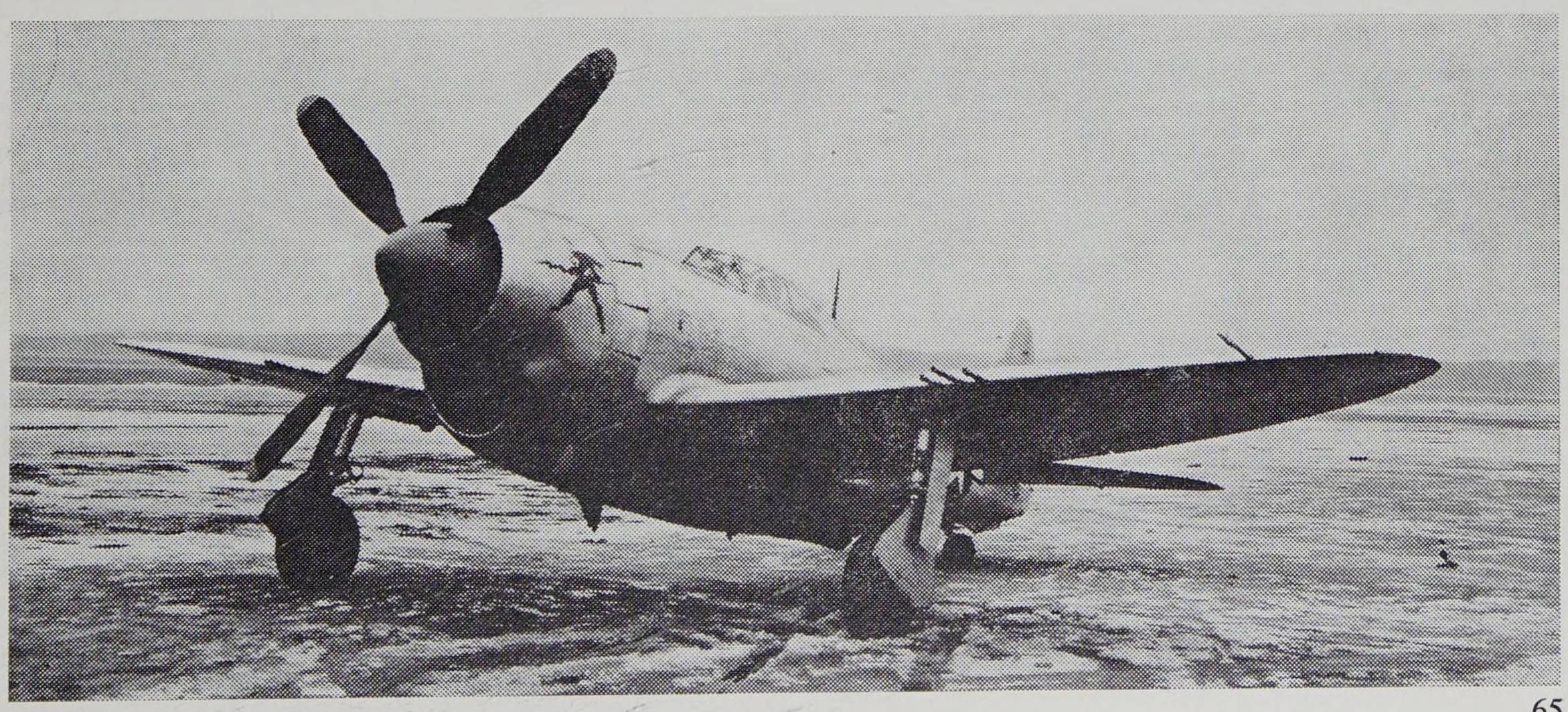
The second XP-47H. (Photo: Hal Martin)

Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 9,900lb., Gross 14,000lb., Max. 17,000lb. Speeds: 426m.p.h. at 30,000ft.. Landing 106m.p.h. Climb: 6min. to 15,000ft., 8·1min. to 20,000ft., 10·5min. to 25,000ft., 13·5min. to 30,000ft. Service Ceiling: 40,000ft. Fuel: Internal 305gal., External Max. 375gal. Range: Max. 800 miles at 10,000ft. (4·2hrs.), Normal 390 miles at 25,000ft. Armament: 6 or 8×0·50″m.g. with from 267 to 425r.p.g., Bombs 2×1,000lb. or 3×500lb., etc. Max. load 2,500lb. Changes: New propeller. 13ft. Curtiss paddle-blade type. A-23 model turbo-regulator. First Evansville aircraft in natural metal finish in this block.

Model & Block No.: P-47D-25-RE. No. Built: 385. A.A.F. Serials: 42-26389 to 42-26773. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Hamilton Standard Hydromatic 13′ 1⅞″ diameter. Dimensions: Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 10,000lb., Gross 14,600lb., Max. 17,500lb. Speeds: Max. 429m.p.h. at 30,000ft., Landing 106m.p.h. Climb: 6·2min. to 15,000ft., 8·5min. to 20,000ft., 11min. to 25,000ft., 14min. to 30,000ft. Service Ceiling: 42,000ft. Fuel: Internal 370gal., External Max. 410gal. Range: Max. 1,030 miles at 10,000ft. (5·3hrs.), Normal 590 miles at 25,000ft. Armament: 6 or 8×0·50″m.g. with from 267 to 425r.p.g., Bombs 2×1,000lb., etc. Max. load 2,500lb. Changes: 360° vision 'bubble' canopy. Cut down rear fuselage. Canopy electrically operated. Flat windshield. Increased oxygen. Two extra bottles in rear fuselage (each 720cu. ft. oxygen 450lb./sq. in.). Cockpit layout changes, repositioned oil cooler shutter switch; repositioned toggle switch for inter-cooler. Turbo-tachometer. Larger main tank with 270gal. capacity. Remarks: Originally scheduled for production as P-47L.

Model & Block No.: P-47D-26-RA. No. Built: 250. A.A.F. Serials: 42-28189 to 42-28438. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric 13′ 0″ diameter. Dimensions: Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights:

XP-47J showing cowl detail.



Empty 10,000lb., Gross 14,500lb., Max. 17,500lb. Speeds: 423m.p.h. at 30,000ft., Landing 105m.p.h. Climb: 6·2min. to 15,000ft., 8·5min. to 20,000ft., 11min. to 25,000ft., 14min. to 30,000ft. Service Ceiling: 42,000ft. Fuel: Internal 370gal., External Max. 410gal. Range: Max. 1,030 miles at 10,000ft. (5·3hrs.), Normal 590 miles at 25,000ft. Armament: 6 or 8 ×0·50″m.g. with from 267 to 425r.p.g., Bombs Max. load 2,500lb. Remarks: Evansville. Changes similar to P-47D-25-RE.

Model & Block No.: P-47D-27-RE. No. Built: 615*. A.A.F. Serials: 42-26774 to 42-27388*. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Hamilton Standard Hydromatic 13′ 1⅞″ diameter. Other data similar to P-47D-25-RE. Changes: Detail changes in fuel system. Remarks: *42-27385, 42-27386 and 42-27388 taken from line and completed as YP-47Ms. *42-27387 taken from line and completed as XP-47N.

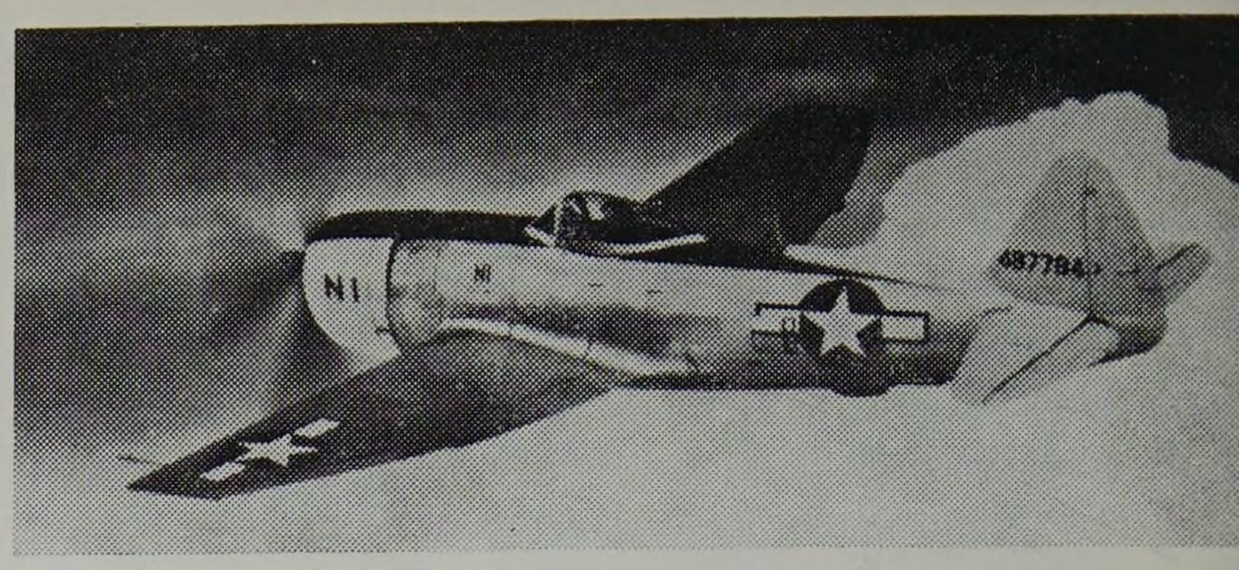
Model & Block No.: P-47D-28-RA. No. Built: 1,028. A.A.F. Serials: 42-28439 to 42-29466. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric C542S-A114 13′ 0″ diameter. Other data similar to P-47D-26-RA. Remarks: Evansville. Changes similar to P-47D-27-RE.

Model & Block No.: P-47D-28-RE. No. Built: 750. A.A.F. Serials: 44-19558 to 44-20307. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric C542S-A114 13′ 0″ diameter. Other data similar to P-47D-25-RE. Changes: Propeller change from Hamilton to Curtiss paddle-blade type.

21177 MUST BE 44-21107
20308 Model & Block No.: P-47D-30-RE. No. Built: 800.
869 A.A.F. Serials: 44-20308 to 44-21177. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric C542S-A114 13′ 0″ diameter. Other data similar to P-47D-25-RE. Changes: Zero rail rocket shackles, five rockets each wing.

177
108
69

Model & Block No.: P-47D-30-RA. No. Built: 1,800. A.A.F. Serials: 44-32668 to 44-33867, 44-89684 to 44-90283. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric C-642S-B 13′ 0″ diameter. Other data similar to P-47D-26-RA. Remarks: Evansville. Changes similar to P-47D-30-RE.



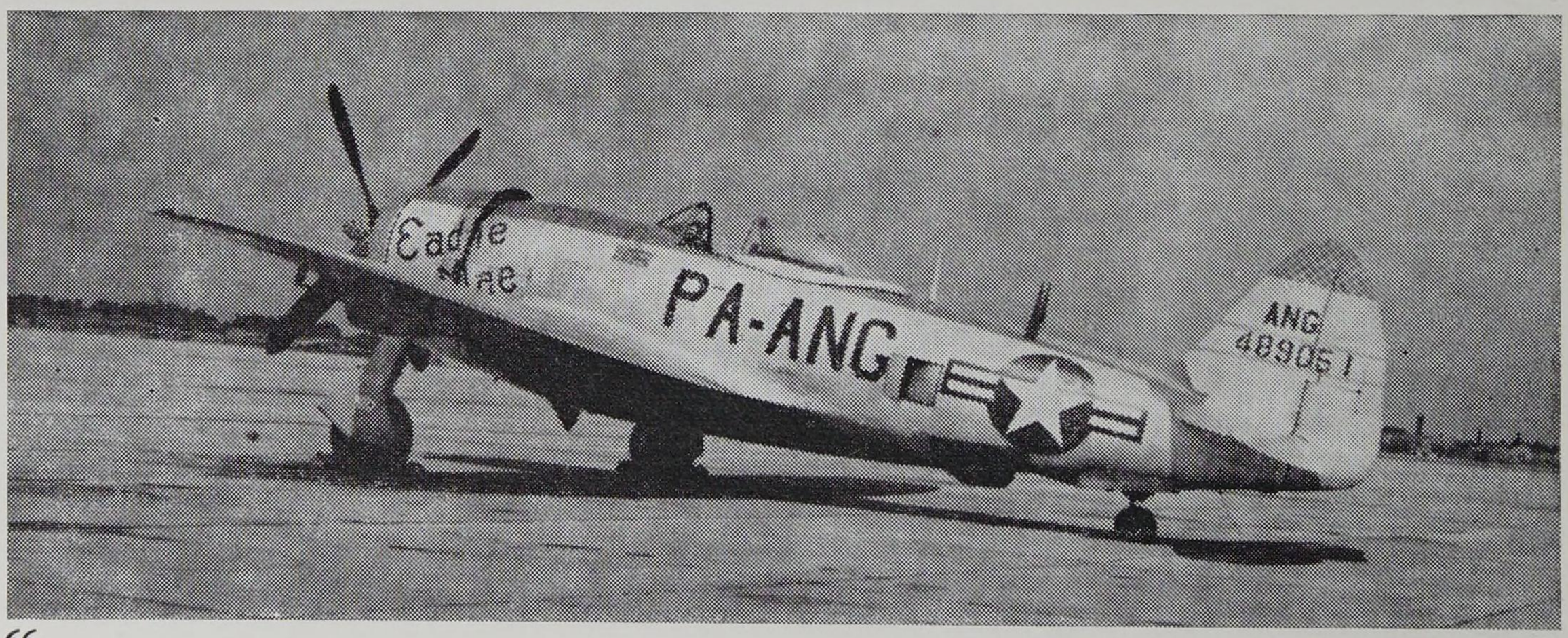
First production P-47N-1-RE (Photo: Republic)

Model & Block No.: P-47D-40-RA. No. Built: 665. A.A.F. Serials: 44-90284 to 44-90483, 45-49090 to 45-49554. Engine: R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric C-642S-B 13′ 0″ diameter. Other data similar to P-47D-26-RA. Changes: Dorsal fin as factory installation.

Model: XP-47E. No. Built: One. A.A.F. Serial: 41-6065. Engine: R-2800-21 and R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric 12′ 2″ diameter, later Hamilton Hydromatic 13′ 1⅞″ diameter. Dimensions: Span 40′ 9″, Length 35′ 0″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 9,350lb., Gross 12,250lb. Speeds: Max. 429m.p.h. at 28,000ft., Landing 92m.p.h. Fuel: Internal 305gal. Remarks: Taken from P-47B line and completed as pressure cabin model for high altitude flight. Air intake for pressurising unit situated in left wing root. Aircraft much modified during life. Performance similar to standard P-47B but higher speeds obtained with new engine and propeller.

Model: XP-47F. No. Built: One. A.A.F. Serial: 41-5938. Engine: R-2800-21, Rating 2,000/2,300h.p. Propeller: Curtiss Electric 12′ 2″ diameter. Dimensions Span 42′ 0″, Length 35′ 0″, Height 14′ 2″, Wing area 322sq. ft. Weights: Empty approx. 9,000lb. Fuel: Internal 305gal. Speeds: Max. attained, approx. 430m.p.h. Remarks: A P-47B rebuilt with laminar flow type wing. Completely new wing shape with increased span. No armament installed; aircraft purely experimental. Crashed and destroyed on October 14, 1943; pilot killed.

P-47N-15-RE, 'Eadie Mae' of Pennsylvania Air National Guard. (Photo: D. Menard)



P-47N-20-RE of 14th Fighter Group. (Photo: D. Menard)

Model & Block No.: P-47G-CU. No. Built: 20. A.A.F. Serials: 42-24920 to 42-24939. Engine: R-2800-21, Rating 2,000h.p. Propeller: Curtiss Electric 12′ 2″ diameter. Dimensions: Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 9,900lb., Gross 13,500lb., Max. 15,000lb. Speeds: Max. 420m.p.h. at 10,000ft., Landing 102m.p.h. Climb: 7·5min. to 15,000ft., 12min. to 20,000ft., 16min. to 25,000ft., 22min. to 30,000ft. Service Ceiling: 42,000ft. Fuel: Internal 305gal., External 200gal. Range: Max. 835 miles at 10,000ft., Normal 400 miles at 25,000ft. Armament: 6 to 8 ×0·50″m.g., 267r.p.g. normal. Remarks: Built by Curtiss at Buffalo. Similar to P-47C-1-RE. First aircraft, December 1942.

Model & Block No.: P-47G-1-CU. No. Built: 40. A.A.F. Serials: 42-24940 to 42-24979. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47G-CU. Remarks: Similar standard to P-47C-5-RE.

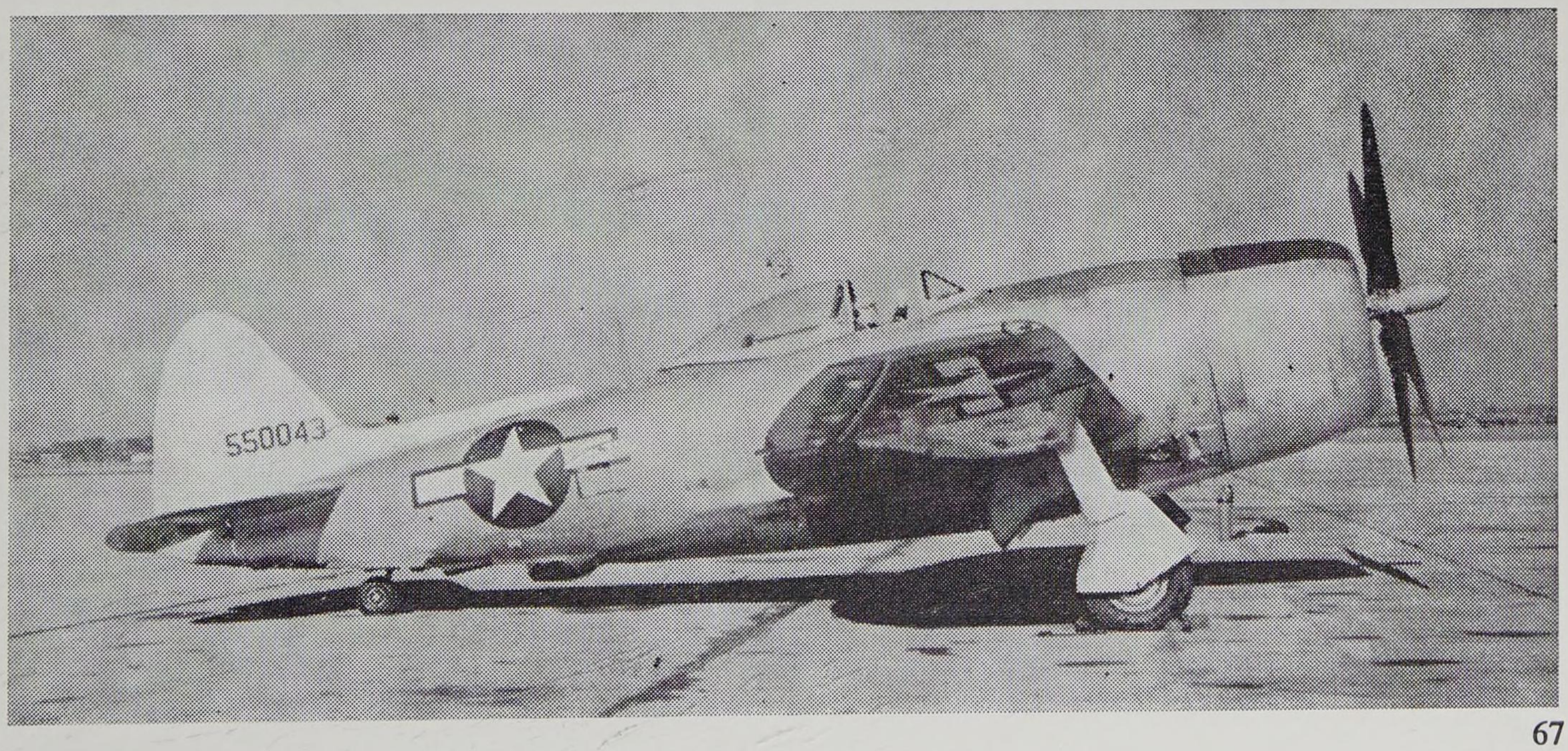
Model & Block No.: P-47G-5-CU. No. Built: 60. A.A.F. Serials: 42-24980 to 42-25039. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47G-CU. Remarks: Similar standard to P-47D-1-RE.

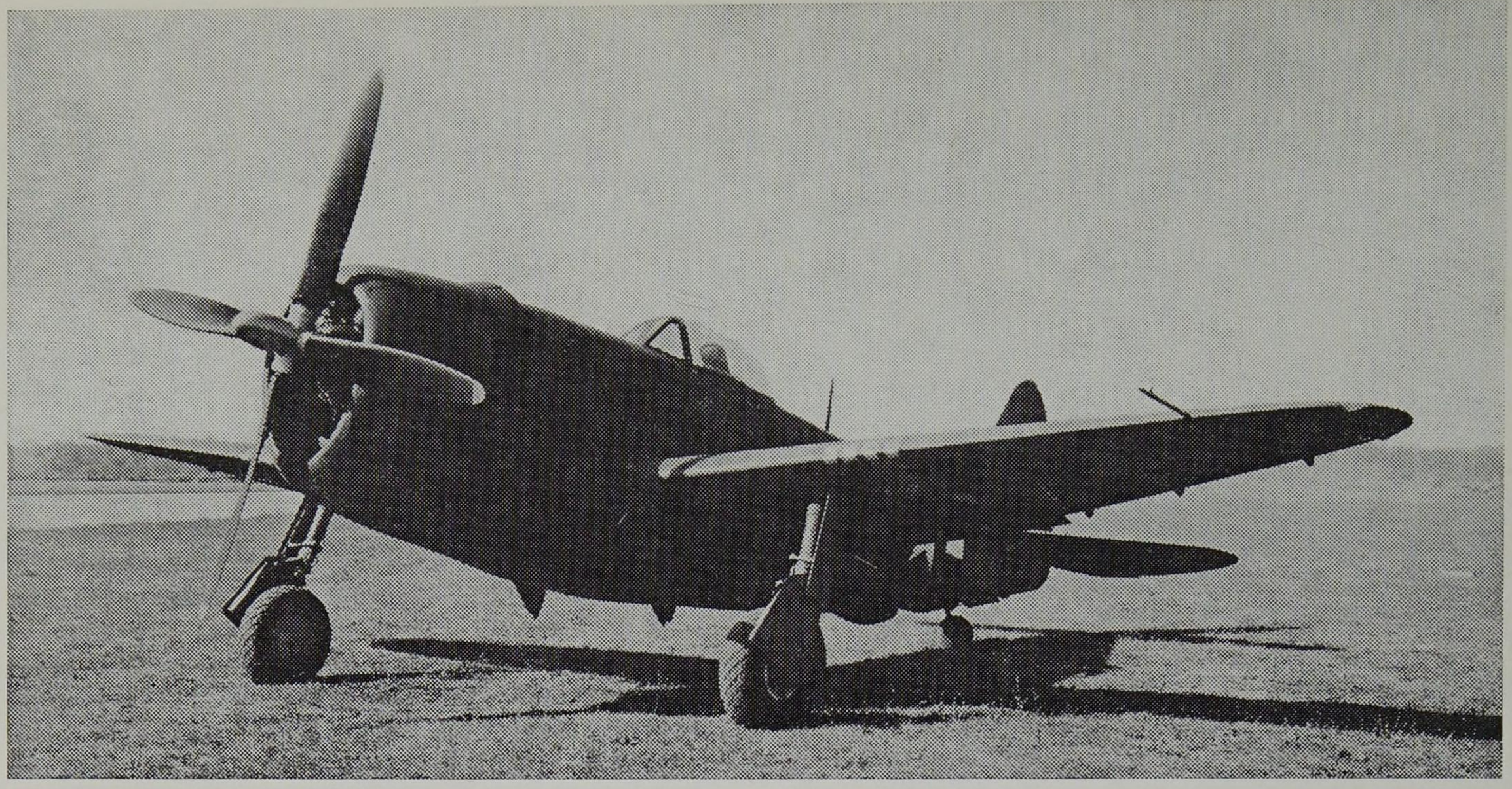
Model & Block No.: P-47G-10-CU. No. Built: 80. A.A.F. Serials: 42-25040 to 42-25119. Engine: R-2800-21, Rating 2,000h.p. Other data similar to P-47G-CU. Remarks: Similar standard to P-47D-6-RE. B-7 two-point bomb shackles fitted.

Model & Block No.: P-47G-15-CU. No. Built: 154. A.A.F. Serials: 42-25120 to 42-25273. Engine: R-2800-63, Rating 2,000/2,300h.p. Speeds: Max. 430m.p.h. at 30,000ft., Landing 104m.p.h. Other data similar to P-47G-CU. Remarks: Similar standard to P-47D-11-RE. Curtiss built P-47s were used principally in a training role. Two P-47G-15-CU modified into experimental two-seat trainers. Main fuel tank reduced in size and second cockpit constructed above it. Cabin extended forward over new cockpit.

Model: XP-47H. No. Built Two. A.A.F. Serials: 42-23297, 42-23298. Engine: Chrysler XIV-2220-1, 2,300h.p. Propeller: Curtiss Electric 13′ 0″ diameter. Dimensions: Span 40′ 9″, Length 39′ 2″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 11,442lb., Gross 13,750lb. Speeds: Max. 490m.p.h. at 30,000ft. Service Ceiling: 36,000ft. Fuel: Internal 295gal. Range: Max. 1,000 miles at 10,000ft., Normal 700 miles at 25,000ft. Armament: Provision for six 6 ×0·50″m.g. but not installed. Remarks: Both aircraft completed originally as P-47D-15-RA. Purely engine test bed models for evaluation of Chrysler inverted-vee power plant.

P-47N-20-RA, one of the small Evansville batch (Photo: D. Menard)





XP-47K in its original form. (Photo: U.S.A.F.)

Model: XP-47J. No. Built: One. A.A.F. Serials: 43-46952. Engine: R-2800-57, Rating 2,100/2,800h.p. Propeller: Curtiss Electric 13′ 0″ diameter. Dimensions Span 40′ 11″, Length 33′ 3″, Height 14′ 3″, Wing area 300sq. ft. Weights: Empty 9,663lb., Gross 12,400lb., Max. 16,780lb. Speeds: Max. 504m.p.h. at 34,300ft., Landing 92m.p.h. Climb: 4·5min. to 15,000ft., 4·25min. to 20,000ft. Fuel: Internal 287gal. Range: Max. 1,070 miles at 10,000ft., Normal 765 miles at 25,000ft. Service Ceiling: 45,000ft. Armament: 6×0·50″m.g. with 267r.p.g. Remarks: With A.A.F. testing, XP-47J could not reach the top speed claimed by Republic. Aircraft superceded by XP-72 as high-performance interceptor project. Cooling fan for engine. More compact cowl. New model (CH-5) turbo-supercharger. Many detail changes and re-designed components aimed at reducing weight.

Model: XP-47K. No. Built: One. A.A.F. Serial: 42-8702. Engine: R-2800-21 and R-2800-59, Rating 2,000/2,300h.p. Propeller: Curtiss Electric 12′ 2″ diameter. Dimensions: Span 40′ 9″, later 42′ 7″, Length 36′ 1″, Height 14′ 2″. Weights: Empty 10,000lb., Gross 14,000lb. (original configuration). Speeds: Max. 415m.p.h. at 30,000ft. (original configuration). Fuel: Internal 305gal. Armament: 6 or 8×0·50″m.g. with 267r.p.g. Remarks: Originally last P-47D-5-RE. Taken from line and extensively modified to take a 360° vision bubble canopy. Modification completed July 3, 1943. Subsequently reworked with long-range wing similar to that eventually produced for P-47N.

Model: XP-47L. No. Built: One. A.A.F. Serials: 42-76614. Engine: R-2800-21, later R-2800-59 and R-2800-57. Propeller: Curtiss Electric 12′ 2″ diameter, later 13′ 0″ diameter model. Dimensions: Span 40′ 9″, Length 36′ 1″, Height 14′ 2″, Wing area 300sq. ft. Weights: Empty 10,000lb., Gross 14,600lb., Max. 17,500lb. Speeds: Max. 429m.p.h. at 30,000ft., Landing 106m.p.h. Fuel: Internal 370gal. Range: Max. 1,030 miles at 10,000ft., Normal 590 miles at 25,000ft. Armament: 6 or 8×0·50″m.g. with from 267 to 425r.p.g. Remarks: Originally last production P-47D-20-RE. Taken from line for modification. Similar to XP-47K but with main tank and detail changes. Produced as P-47D-25-RE. R-2800-C type engine installed at later date for testing.

Model: YP-47M-RE. No. Built: Three. A.A.F. Serials: 42-27385, 42-27386, 42-27388. Engine: R-2800-14W and R-2800-57, Rating 2,100/2,800h.p. Propeller: Curtiss Electric C642S-B40 13′ 0″ diameter. Dimensions: Span 40′ 9″, Length 36′ 4″, Height 14′ 9″, Wing area 300sq. ft. Weights: Empty 10,340lb., Gross 15,000lb., Max. 18,000lb. Speeds: Max. 473m.p.h. at 32,000ft., Landing 99m.p.h. Climb: 13·4min. to 32,000ft., 5min. to 15,000ft. Service Ceiling: 41,000ft. Fuel: Internal 370gal., External Max. 410gal. Range: 530 miles at 26,000ft. Armament: 6 or 8×0·50″m.g. with 267r.p.g. Remarks: Originally laid down as P-47D-27-RE but taken from line and modified to test R-2800 'C' series engines and new associated components. New CH-5 turbo-supercharger. Unilever Power Control unit fitted giving single lever control of boost, propeller and r.p.m.

21237
21108

Model & Block No.: P-47M-1-RE. No. Built: 130. A.A.F. Serials: 44-21108 to 44-21237. Engine: R-2800-57, Rating 2,100/2,800h.p. Propeller: Curtiss Electric C642S-B40 13′ 0″ diameter. Other data similar to YP-47M. Changes (from P-47D-30-RE): New engine with increased power. CH-5 model turbo-supercharger with C-1 type regulator (model 30-PR8-B2). Automatic manifold pressure switch for water injection. Electric fuel primer. Unilever Power Control unit not installed. Remarks: Basically high-power version of P-47D-30-RE. All aircraft sent to the 56th FG in U.K. Dorsal fin fitted in the U.K.

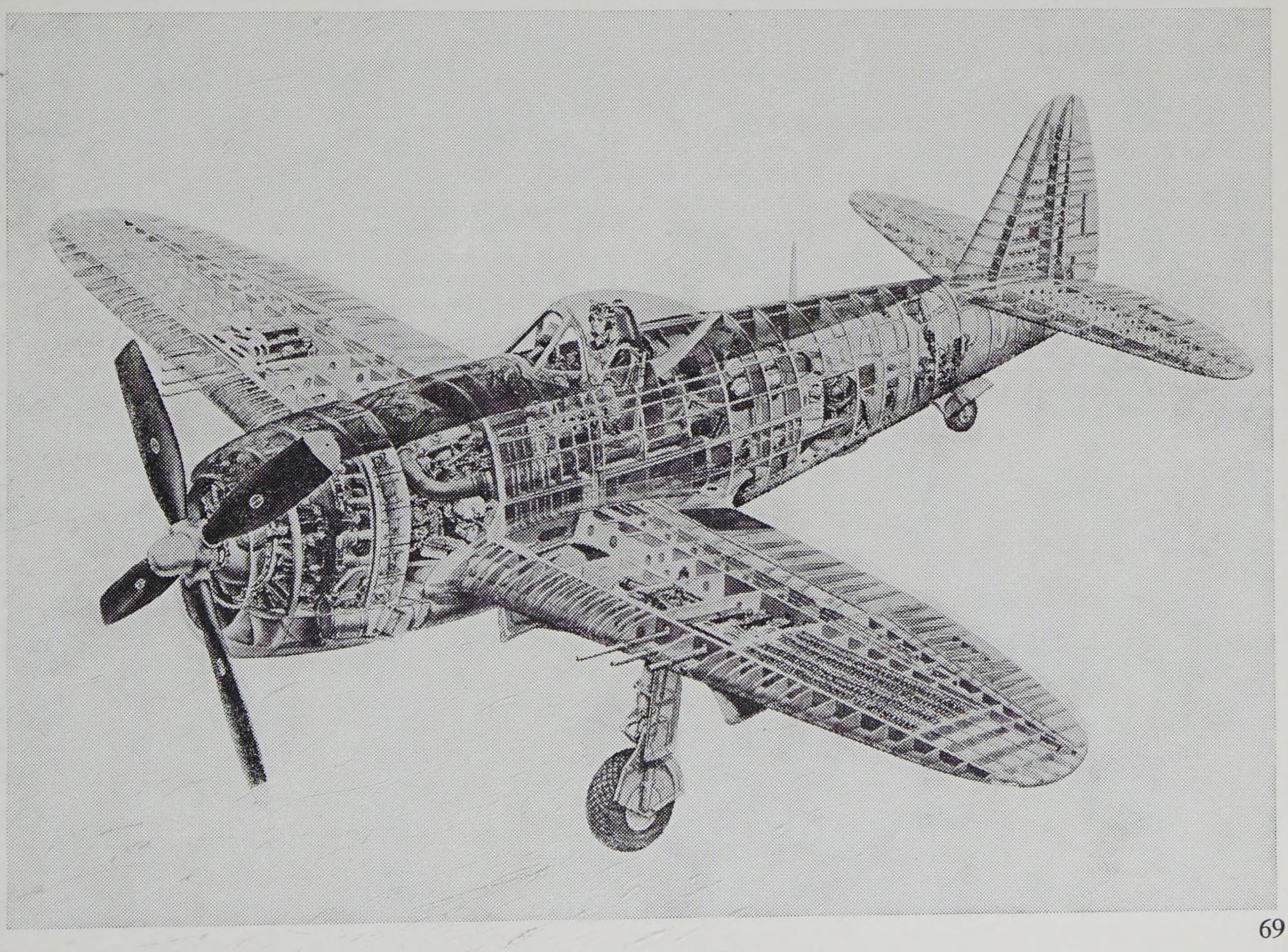
Model: XP-47N. No. Built: One. A.A.F. Serial: 42-27387. Engine: R-2800-57, Rating 2,100/2,800h.p. Propeller: Curtiss Electric C642S-B40 13′ 0″ diameter. Dimensions: Span 42′ 10″, Length 36′ 2″, Height 14′ 8″, Wing area 322·2sq. ft. Weights: Empty 10,988lb., Gross 14,030lb., Max. 20,080lb. Speeds: 467m.p.h. at 32,000ft., Landing 98m.p.h. Climb:

13·5min. to 32,000ft. Service Ceiling: 43,000ft. Fuel: Internal 570gal. Range: Max. 920 miles at 10,000ft., Normal 800 miles at 25,000ft. Armament: 6 or 8×0·50″m.g. with from 267 to 425r.p.g., Bombs Max. load 3,000lb. Changes: (from P-47D-30-RE) New engine. Unilever Power Control. CH-5 model turbo-supercharger and regulator (as P-47M). New wing as tested on XP-47K. Four interconnected self-sealing fuel cells in inboard section of each wing; 200gal. total. Landing light and camera gun relocated. Oxygen wing bottle eliminated. Undercarriage tread increased to 18′ 5 13/16″. Modified undercarriage struts. New downlock cylinder in hydraulic system. 34×9·9 wheels and tyres. New brakes. Flap area increased to 46sq. ft. Aileron area to 27·97sq. ft. Oxygen capacity increased by 80%: total of seven oxygen bottle in rear fuselage. New collecting ring for exhaust system. Improved engine mount. New electrical generator. Automatic operation of cowl flaps by thermal-sensitive electric motors. New hydraulic unit for cowl flap power. Automatic cockpit heat control. Automatic operation of intercooler doors by thermal-sensitive electric motors. Automatic operation of water injection by manifold pressure sensitive switch (as P-47M). Oil tank capacity increased to 40gal. Water/alcohol tank to 30gal. Relocation of electrical switches in cockpit. Remarks: A P-47D-27-RE taken from line and reworked. Fuselage basically as P-47M. Only 80 of 100gal. in each wing fuel cells could be drawn on XP-47N.

Model & Block No.: P-47N-1-RE. No. Built: 550. A.A.F. Serials: 44-87784 to 44-88333. Engine: R-2800-57, Rating 2,100/2,800h.p. Propeller: Curtiss Electric C642S-B40 13′ 0″. Dimensions: Span 42′ 7″, Length 36′ 1″, Height 14′ 8″, Wing area 322·2sq. ft. Weights: Empty 10,988lb., Gross 13,823lb., Max. 21,200lb. Speeds: 467m.p.h. at 32,000ft., Landing 98m.p.h. Climb: 14·2min. to 25,000ft., 9min. to 15,000ft. Service Ceiling: 43,000ft. Fuel: Internal 556gal., External Max. 700gal. Range: Max. 2,000 miles at 25,000ft., Normal 800 miles at 25,000ft. Armament: 6 or 8×0·50″m.g. with from 267 to 425r.p.g., Bombs Max. load 3×1,000lb. Changes (from XP-47N): Unilever Power Control omitted. Replaced by Automatic Engine Control unit. Scintilla engine ignition system. New boost/propeller mixture/throttle control quadrant in cockpit. Modified fuel cells in wings giving total of 186gal. Provision for 300gal. tank sway braces added to bottom of each wing panel. Landing gear cockpit warning system changes. Remarks: Speed limit of 200m.p.h. when 300gal. wing tanks installed. Fuel consumption 300gal./hr. at 2,800h.p., 92gal./hr. at 1,140h.p. cruise. Max. 72°h.g. manifold pressure at War Emergency power. At gross weight required 3,800ft. take-off run to clear 50ft. obstacle.

Model & Block No.: P-47N-5-RE. No. Built: 550. A.A.F. Serials: 44-88334 to 44-88883. Engine: R-2800-57 or R-2800-73, Rating 2,100/2,800h.p. Other data similar to P-47N-1-RE. Changes: Minor radio changes. Installation of zero (length) rail rocket launchers. Provision for quick removal of wing tank sdaptors. Installation of tail warning radar AN/APS-13. Installation of General Electric C-1 autopilot. Revised rudder pedals. Catapault launching provision. General Electric ignition system (on R-2800-73 engine). Homing radar. Remarks: No figures available but

Cutaway drawing of P-47D-25-RE . (Photo: Republic)



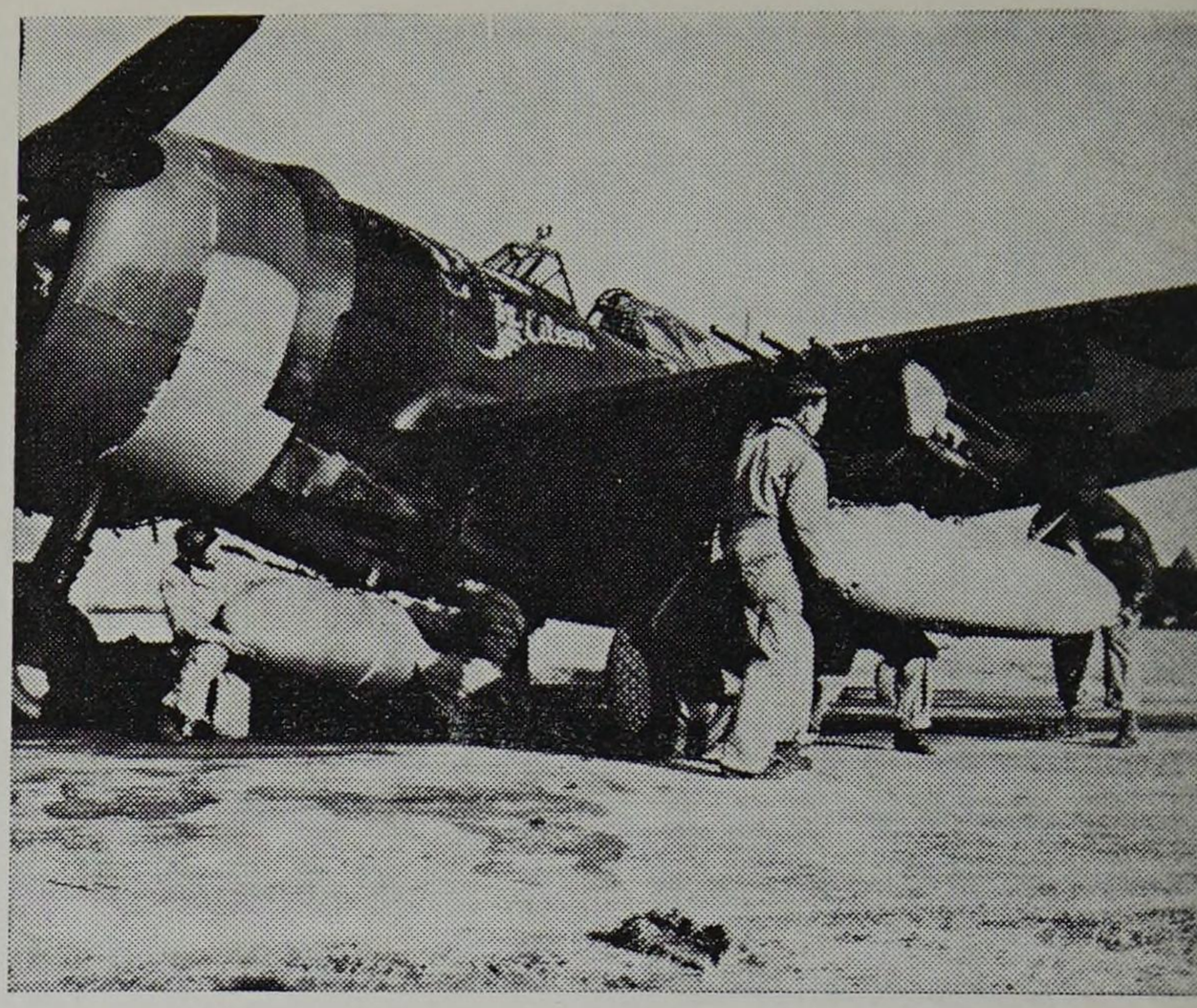
P-47N-5-RE was slightly heavier and slower than previous model.

Model & Block No.: P-47N-15-RE. No. Built: 200. A.A.F. Serials: 44-88884 to 44-89083. Engine: R-2800-73, Rating 2,100/2,800h.p. Other data similar to P-47N-1-RE. Changes: Installation of S-1 bomb rack in place of B-7 shackles. Pilot seat with arm rests. K-14A or K-14B gunsight in place of K-14. Eliminate turbo-tachometer and warning light for CH-5 turbo-supercharger. Automatic Engine Control unit omitted.

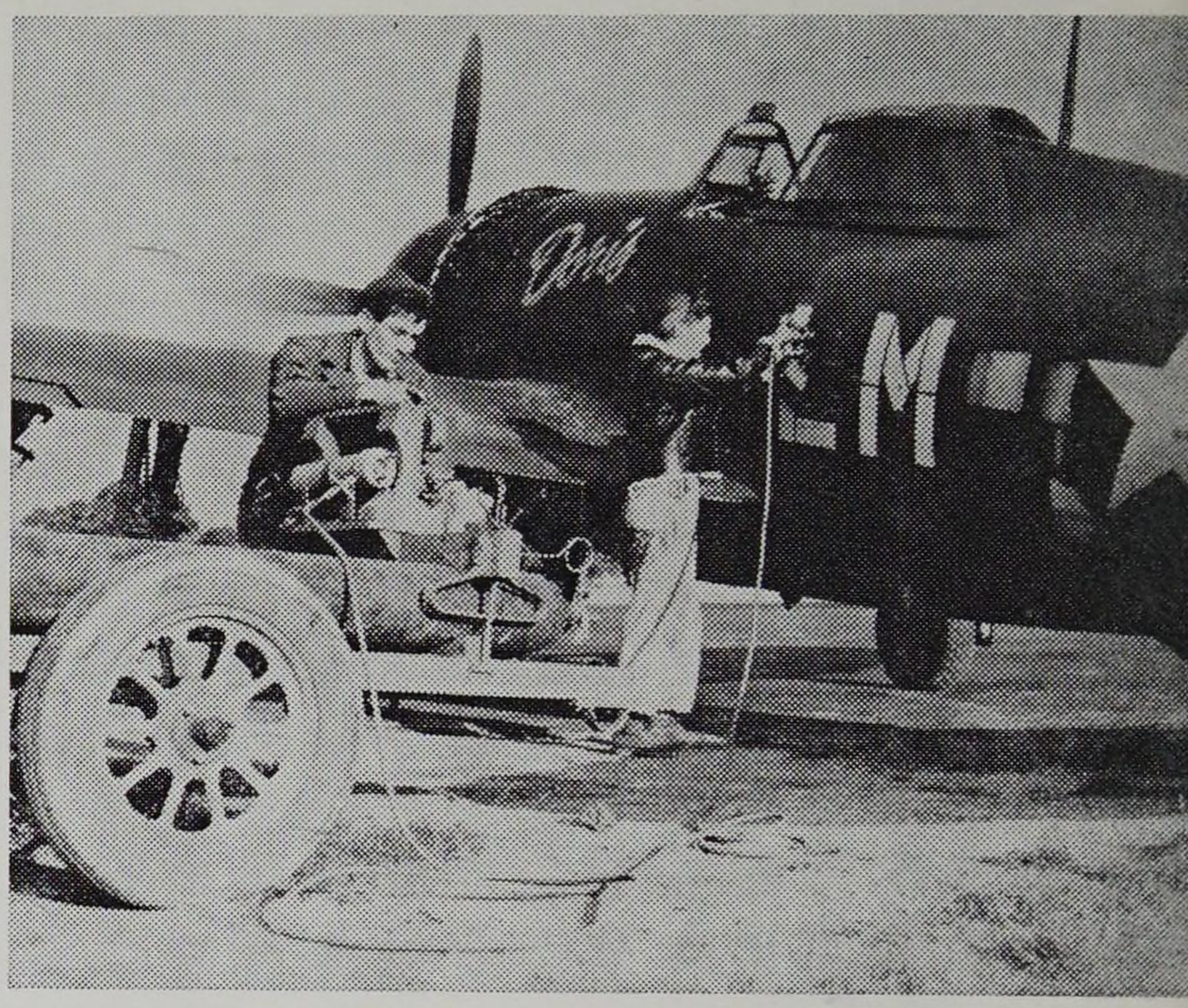
Model & Block No.: P-47N-20-RE. No. Built: 200. A.A.F. Serials: 44-89084 to 44-89283. Engine: R-2800-73 or R-2800-77, Rating 2,100/2,800h.p. Other data similar to P-47N-1-RE. Changes: Radio change. Installation of emergency fuel system. Provision for individual pressurising of jettisonable tanks. Aero-Tech manifold pressure switch replacing L.M. Persons.

Model & Block No.: P-47N-20-RA. No. Built: 149. A.A.F. Serials: 45-49975 to 45-50123. Engine: R-2800-73 or R-2800-77, Rating 2,100/2,800h.p. Other data similar to P-47N-1-RE. Remarks: Evansville. Similar to P-47N-20-RE. Revised cockpit floor with smooth rudder pedal track introduced with 45-50051. Production tailed-off in September 1945.

Model & Block No.: P-47N-25-RE. No. Built: 167. A.A.F. Serials: 44-89284 to 44-89450. Engine: R-2800-73 or R-2800-77 or R-2800-81, Rating 2,100/2,800h.p. Other data similar to P-47N-1-RE. Changes: Installation of Automatic Engine Controls, plus Boost Reset. General Electric C-1 unit (model 39PC1B2). Reinstallation of autopilot. Revised cockpit floor with smooth rudder pedal track (from 44-89294). Redesigned tail wheel linkage. Auxiliary cockpit ventilation. (Not known if this item actually installed before production ceased). Reinforced aileron for rocket blast. Reinforced flap for rocket blast. Remarks: Final Farmingdale production. Line ceased in October 1945, but a few examples not delivered to A.A.F. until December. Automatic Engine Controls not available for installation on P-47N-15 and -20 during production.



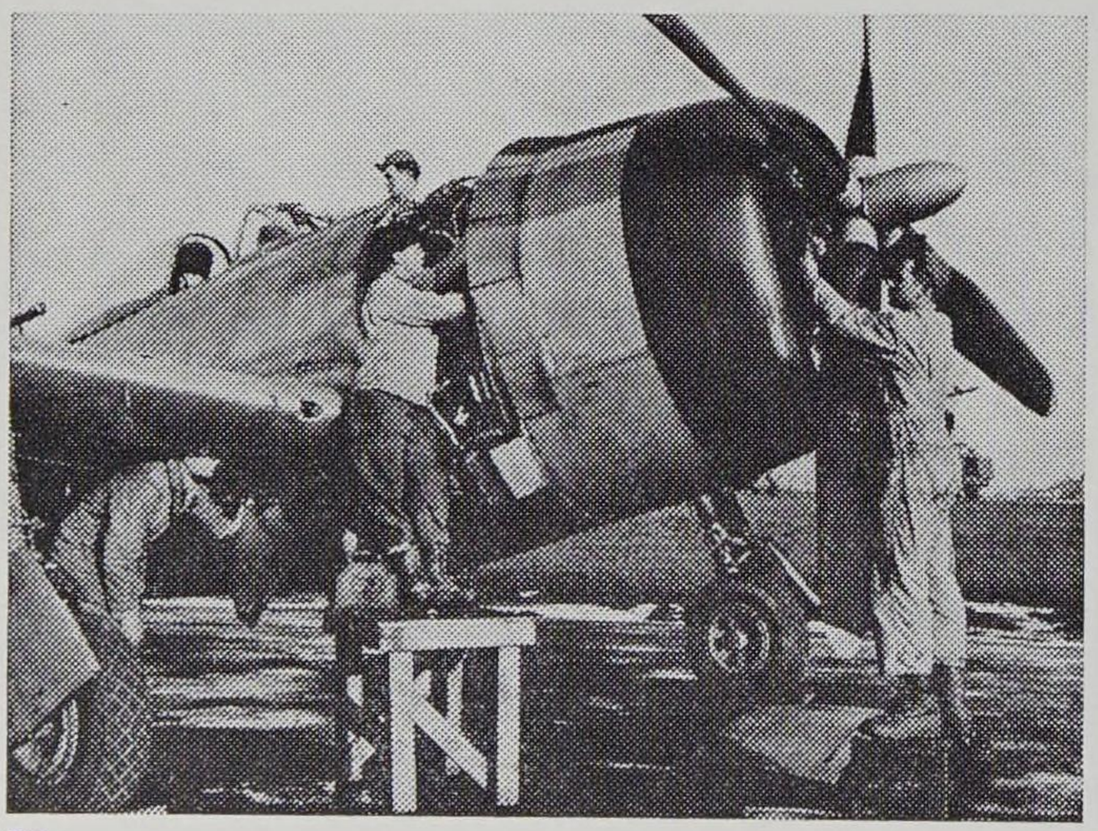
Crewmen of the 62nd F.S. attaching drop tanks—belly 108 gal. and wing 165 gal.—to a well-worn P-47D-10-RE decorated with a 'gun-totin'' hornet and name of 'Eileen'.

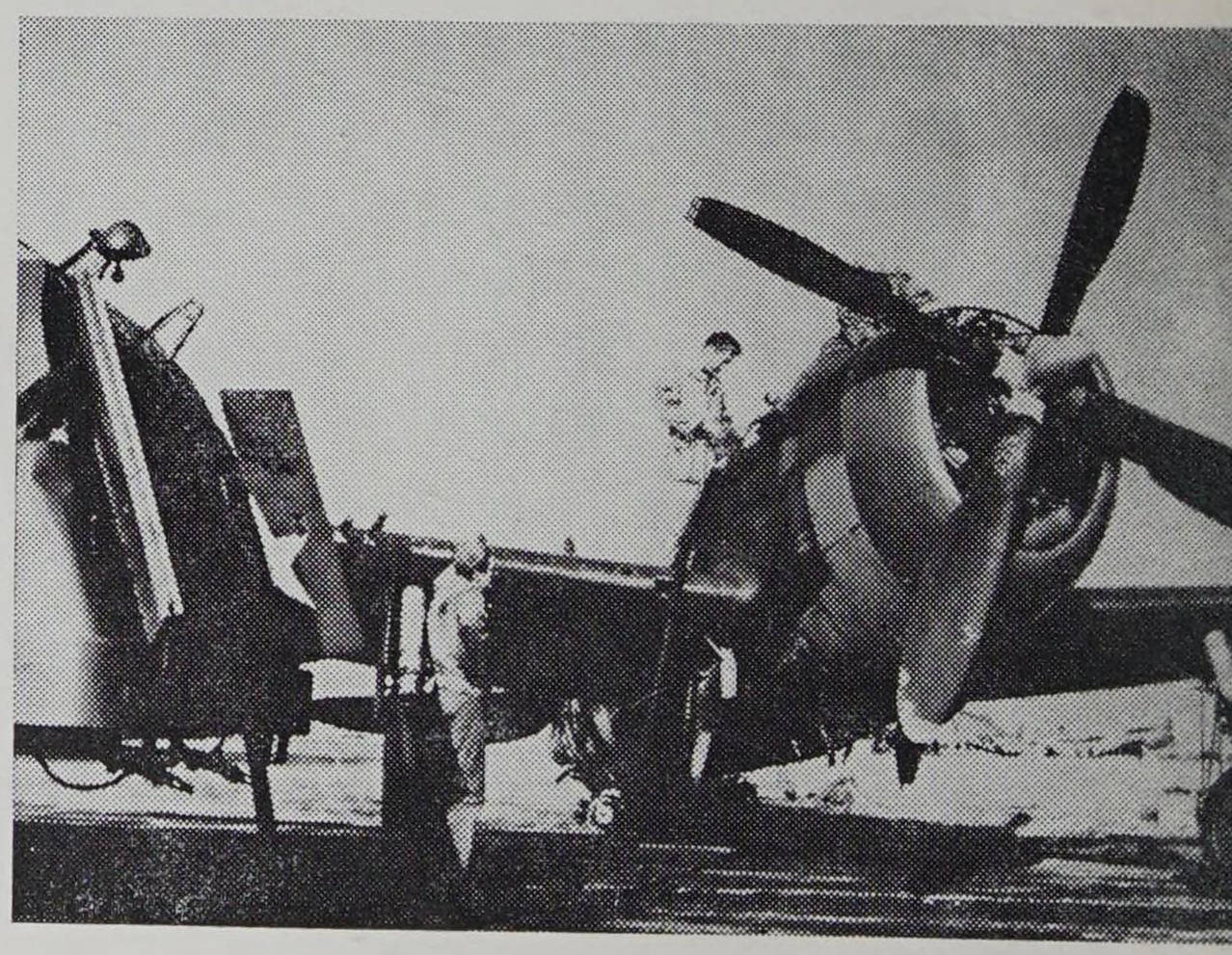


Another older P-47D delegated to operational training duties with the 62nd F.S. Ground crew are replenishing 'Doris'—which has factory-fitted rear-view mirror—with oxygen supplies.

A second view of the P-47D-10-RE named 'Eileen'. Here it is being topped-up with 100 octane fuel in the main tanks.

Final check for a factory-fresh P-47D-30-RE (serial 44-20626; code letters HV:X) of the 61st F.S. The colour band around the cowling was scarlet, which distinguished all Thunderbolts of the 56th Fighter Group. Note that by this time the external rear-view mirror was absent.





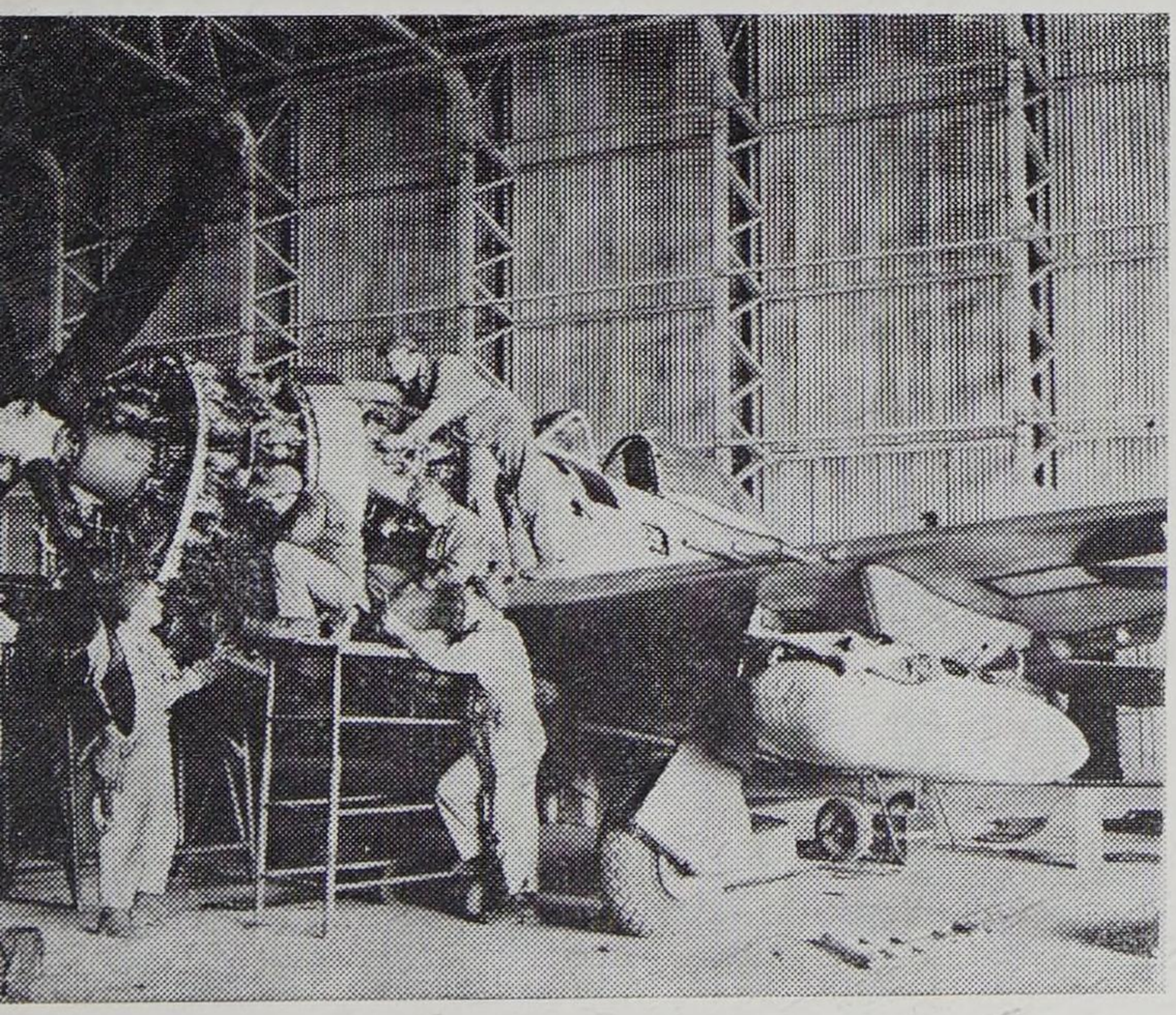
The big Curtiss Electric paddle-blade propeller seems to dwarf the crewmen working on the personal Thunderbolt of Captain Michael J Jackson, a P-47D-27-RE named 'Teddy'. The 0·50 in. Brownings have been removed temporarily from the starboard wing.

THUNDERBOLTS BUILT FOR OTHER NATIONS

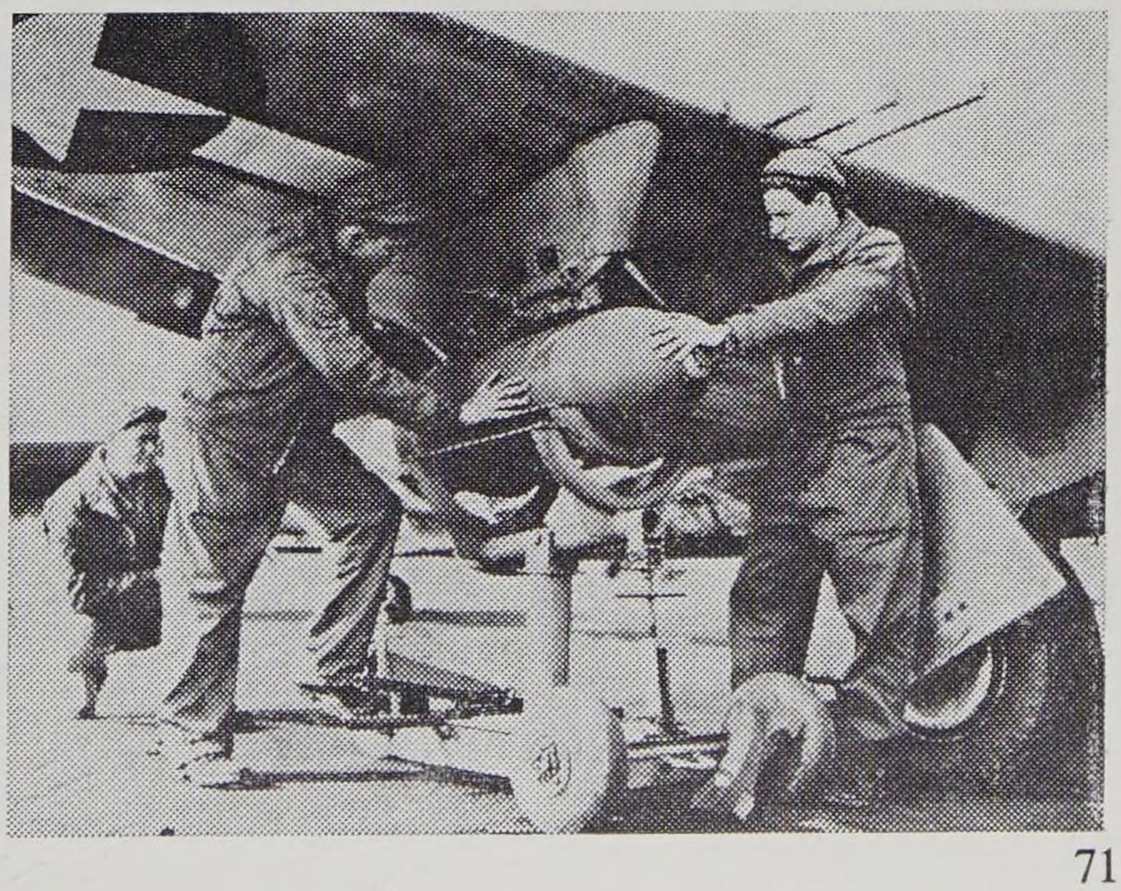
P-47s supplied to other nations during the Second World War, were all from Army Air Force contracts. British, Russian and Brazilian consignments were made straight from the factories and finished in camouflage colours. Mexican and French units in combat areas were supplied from local U.S.A.A.F. depots.

Great Britain: 918 allocated; 88 cancelled; 558 delivered.
Thunderbolt Mk. I, 240 allocated. A.A.F. Model P-47D-22-RE. R.A.F. serials: FL731–FL850, HB962–HD181.
Thunderbolt Mk. II, 590 allocated. A.A.F. Model P-47D-25-RE. R.A.F. serials: HD182–HD201. A.A.F. Model P-47D-30-RE. R.A.F. serials: KJ128–KJ367. A.A.F. Model P-47D-30-RA. R.A.F. serials: KL168–KL347. A.A.F. Model P-47D-40-RA. R.A.F. serials: KL838–KL887.

Everybody smile; a posed photograph of a late model P-47D of the 63rd F.S. with cowling removed from the R-2800-59. Used as a flying jacket 'shelf' under the port wing is a U.K.-fabricated, steel-type 215 gal. drop tank; a crude but effective welded device.



Attaching a 500 lb. wing bomb by means of a jack-hoist to a 62nd F.S. Thunderbolt. This later-type wing pylon was comparatively simple to remove and permitted improved performance when range considerations were not paramount.



Some of these aircraft were destroyed in accidents before delivery.

U.S.S.R.: Russian designation unknown. 203 supplied. A.A.F. Model 3 P-47D-10-RE. A.A.F. serials: 42-75201–42-75203. A.A.F. Model 100 P-47D-22-RE. A.A.F. serials: 42-25539–42-25658. A.A.F. Model 50 P-47D-27-RE. A.A.F. serials: 42-27015–42-27064. A.A.F. Model 50 P-47D-27-RE. A.A.F. serials: 42-27115–42-27164.
Seven aircraft lost before delivery. Three aircraft sent via Alaska-Siberia, four by ship to north Russia, and 196 by ship to the Persian Gulf.

Brazil: A.A.F. Model: 50 P-47D-26-RE. A.A.F. Serials: 42-26724–42-26773.

ALLIED SQUADRONS USING THE P-47 DURING W.W.2.

This listing does not include training squadrons or first line squadrons engaged in a defensive role outside combat areas. The U.S.A.A.F. listing also gives the parent group, area of operations and the dates (month and year) of use in a combat theatre. Last date is often also that of movement of unit or disbandment. Similar dates are given for R.A.F. squadrons.

Abbreviations: ACG—Air Commando Group, FG—Fighter Group, FS—Fighter Squadron, FS(C)—Fighter Squadron (Commando), ERS—Emergency Rescue Squadron, CBI—China/India/Burma theatre, ETO—European Theatre of Operations, MTO—Mediterranean Theatre of Operations, (see below) PTO—Pacific Theatre of Operations.

Unit	*Parent Group*	*Area of Operation*	*Active-Inactive*	*Model*
1 FS	413 FG	PTO	5/45–10/46	P-47N
5 ERS	—	ETO	5/44–10/45	P-47D
5 FS(C)	1 ACG	CBI	9/44–5/45	P-47D
6 FS(C)	1 ACG	CBI	9/44–5/45	P-47D
9 FS	49 FG	PTO	11/43–4/44	P-47D
10 FS	50 FG	ETO	3/44–8/45	P-47D
19 FS	318 FG	PTO	6/44–12/45	P-47D & N
21 FS	413 FG	PTO	5/45—10/46	P-7N
22 FS	36 FG	ETO	4/44–2/46	P-47D
23 FS	36 FG	ETO	4/44–2/46	P-47D
34 FS	413 FG	PTO	5/45–10/46	P-47N
36 FS	8 FG	PTO	12/43–2/44	P-47D
39 FS	35 FG	PTO	12/43–3/45	P-47D
40 FS	35 FG	PTO	12/43–3/45	P-47D
41 FS	35 FG	PTO	12/43–3/45	P-47D
53 FS	36 FG	ETO	4/44–2/46	P-74D
58 FS	33 FG	CBI	4/44–10/45	P-47D
59 FS	33 FG	CBI	4/44–10/45	P-47D
60 FS	33 FG	CBI	4/44–10/45	P-47D
61 FS	56 FG	ETO	2/43–10/45	P-47C D &M
62 FS	56 FG	ETO	2/43–10/45	P47C, D &M
63 FS	56 FG	ETO	2/43–10/45	P-47C D &M
64 FS	57 FG	MTO	1/44–8/45	P-47D
65 FS	57 FG	MTO	1/44–8/45	P-47D
66 FS	57 FG	MTO	1/44–8/45	P-47D
69 FS	58 FG	PTO	2/44–12/45	P-47D
73 FS	318 FG	PTO	6/44–12/45	P-47D & N
81 FS	50 FG	ETO	3/44–8/45	P-47D
82 FS	78 FG	ETO	2/43–12/44	P-47C & D
83 FS	78 FG	ETO	2/43–12/44	P-47C & D
84 FS	78 FG	ETO	2/43–12/44	P-47C & D
85 FS	79 FG	MTO	3/44–6/47	P-47D
86 FS	79 FG	MTO	3/44–6/47	P-47D
87 FS	79 FG	MTO	3/44–6/47	P-47D
88 FS	80 FG	CBI	5/44–10/45	P-47D
89 FS	80 FG	CBI	5/44–10/45	P-47D
90 FS	80 FG	CBI	5/44–10/45	P-47D
91 FS	81 FG	CBI	4/44–12/45	P-47D
92 FS	81 FG	CBI	4/44–12/45	P-47D
93 FS	81 FG	CBI	4/44–12/45	P-47D
99 FS	332 FG	MTO	4/44–6/44	P-47D
100 FS	332 FG	MTO	4/44–6/44	P-47D
301 FS	332 FG	MTO	4/44–6/44	P-47D
302 FS	332 FG	MTO	4/44–6/44	P-47D
310 FS	58 FG	PTO	2/44–12/45	P-47D
311 FS	58 FG	PTO	2/44–12/45	P-47D
313 FS	50 FG	ETO	3/44–8/45	P-47D
314 FS	324 FG	MTO	7/44–10/45	P-47D
315 FS	324 FG	MTO	7/44–10/45	P-47D
316 FS	324 FG	MTO	7/44–10/45	P-47D
317 FS	325 FG	MTO	11/43–5/44	P-47D
318 FS	325 FG	MTO	11/43–5/44	P-47D
319 FS	325 FG	MTO	11/43–5/44	P-47D
328 FS	352 FG	ETO	7/43–4/44	P-47D
333 FS	318 FG	PTO	6/44–12/45	P-47D & N
334 FS	4 FG	ETO	2/43–2/44	P-47C & D
335 FS	4 FG	ETO	2/43–2/44	P-47C & D
336 FS	4 FG	ETO	2/43–2/44	P-47C & D
340 FS	348 FG	PTO	6/43–3/45	P-47C & D
341 FS	348 FG	PTO	6/43–3/45	P-47C & D
342 FS	348 FG	PTO	6/43–3/45	P-47C & D
345 FS	350 FG	MTO	7/44–7/45	7P-47D
346 FS	350 FG	MTO	7/44–7/45	P-47D
347 FS	350 FG	MTO	8/44–7/45	P-47D
350 FS	353 FG	ETO	7/43–10/44	P-47D
351 FS	353 FG	ETO	7/43–10/44	P-47D
352 FS	353 FG	ETO	7/43–10/44	P-47D
353 FS	354 FG	ETO	11/44–2/45	P-47D
354 FS	355 FG	ETO	7/43–4/44	P-47D
355 FS	354 FG	ETO	11/44–2/45	P-47D
356 FS	354 FG	ETO	11/44–2/45	P-47D
357 FS	355 FG	ETO	7/43–4/44	P-47D
358 FS	355 FG	ETO	7/43–4/44	P-47D
359 FS	356 FG	ETO	8/43–11/44	P-47D
360 FS	356 FG	ETO	8/43–11/44	P-47D
361 FS	356 FG	ETO	8/43–11/44	P-47D
365 FS	358 FG	ETO	10/43–7/45	P-47D
366 FS	358 FG	ETO	10/43–7/45	P-47D
367 FS	358 FG	ETO	10/43–7/45	P-47D
368 FS	359 FG	ETO	11/43–5/44	P-47D
369 FS	359 FG	ETO	11/43–5/44	P-47D
370 FS	359 FG	ETO	11/43–5/44	P-47D
374 FS	361 FG	ETO	12/43–5/44	P-47D
375 FS	361 FG	ETO	12/43–5/44	P-47D
376 FS	361 FG	ETO	12/43–5/44	P-47D
377 FS	362 FG	ETO	12/43–8/45	P-47D
378 FS	362 FG	ETO	12/43–8/45	P-47D
379 FS	362 FG	ETO	12/43–8/45	P-47D
386 FS	365 FG	ETO	12/43–9/45	P-47D
387 FS	365 FG	ETO	12/43–9/45	P-47D
388 FS	365 FG	ETO	12/43–9/45	P-47D
389 FS	366 FG	ETO	1/44–8/46	P-47D
390 FS	366 FG	ETO	1/44–8/46	P-47D
391 FS	366 FG	ETO	1/44–8/46	P-47D
392 FS	367 FG	ETO	2/45–7/45	P-47D
393 FS	367 FG	ETO	2/45–7/45	P-47D
394 FS	367 FG	ETO	2/45–7/45	P-47D
395 FS	368 FG	ETO	2/44–8/46	P-47D
396 FS	368 FG	ETO	2/44–8/46	P-47D
397 FS	368 FG	ETO	2/44–8/46	P-47D
404 FS	371 FG	ETO	3/44–10/45	P-47D
405 FS	371 FG	ETO	3/44–10/45	P-47D
406 FS	371 FG	ETO	3/44–10/45	P-47D
410 FS	373 FG	ETO	4/44–7/45	P-47D
411 FS	373 FG	ETO	4/44–7/45	P-47D
412 FS	373 FG	ETO	4/44–7/45	P-47D
413 FS	414 FG	PTO	7/44–9/46	P-47N
437 FS	414 FG	PTO	7/44–9/46	P-47N
456 FS	414 FG	PTO	7/44–9/46	P-47N
460 FS	348 FG	PTO	9/44–3/45	P-47D
463 FS	507 FG	PTO	6/45–5/46	P-47N
464 FS	507 FG	PTO	6/45–5/46	P-47N
465 FS	507 FG	PTO	6/45–5/46	P-47N
486 FS	352 FG	ETO	7/43–4/44	P-47D
487 FS	352 FG	ETO	7/43–4/44	P-47D
492 FS	48 FG	ETO	3/44–8/45	P-47D
493 FS	48 FG	ETO	3/44–8/45	P-47D
494 FS	48 FG	ETO	3/44–8/45	P-47D
506 FS	404 FG	ETO	4/44–8/45	P-47D
507 FS	404 FG	ETO	4/44–8/45	P-47D
508 FS	404 FG	ETO	4/44–8/45	P-47D
509 FS	405 FG	ETO	3/44–7/45	P-47D
510 FS	405 FG	ETO	3/44–7/45	P-47D
511 FS	405 FG	ETO	3/44–7/45	P-47D
512 FS	406 FG	ETO	4/44–8/46	P-47D
513 FS	406 FG	ETO	4/44–8/46	P-47D
514 FS	406 FG	ETO	4/44–8/46	P-47D
522 FS	27 FG	MTO	6/44–10/45	P-47D
523 FS	27 FG	MTO	6/44–10/45	P-47D
524 FS	27 FG	MTO	6/44–10/45	P-47D
525 FS	86 FG	MTO	6/44–3/46	P-47D
526 FS	86 FG	MTO	6/44–3/46	P-47D
527 FS	86 FG	MTO	6/44–3/46	P-47D

Royal Air Force

All squadrons in the C.B.I. theatre.

5 Squadron 10/44–2/46 Thunderbolt I and II.
30 Squadron 7/44–12/45 Thunderbolt I and II.
34 Squadron 3/45–12/45 Thunderbolt II
42 Squadron 7/45–12/45 Thunderbolt II (ex-146 Squadron).
60 Squadron 7/45–6/46 Thunderbolt II.
79 Squadron 9/44–12/45 Thunderbolt II.
81 Squadron 6/45–6/46 Thunderbolt II (ex-123 Squadron).
113 Squadron 4/45–10/45 Thunderbolt I and II
123 Squadron 9/44–6/45 Thunderbolt I and II
131 Squadron 6/45–12/45 Thunderbolt II (ex-134 Squadron)
134 Squadron 5/44–6/45 Thunderbolt I and II
135 Squadron 5/44–5/45 Thunderbolt I and II
146 Squadron 9/44–7/45 Thunderbolt I and II
258 Squadron 9/44–12/45 Thunderbolt I and II
261 Squadron 6/44–9/45 Thunderbolt I and II
615 Squadron 6/45–9/45 Thunderbolt II (ex-135 Squadron)

French Air Force

All squadrons in E.T.O.

1/4 Groupe de Chasse	P-47D
1/5 Groupe de Chasse	P-47D
2/3 Groupe de Chasse	P-47D
2/5 Groupe de Chasse	P-47D

Brazilian Air Force: 1 Grupo de Caca. Attached 350 FG, U.S.A.A.F. MTO, P-47D.

Mexican Air Force (Fuerza Aerea Mexicana). 201 Escuadron Aereo de Pelea. Attached 58 FG, U.S.A.A.F. PTO, P-47D.

O6-BTE-275